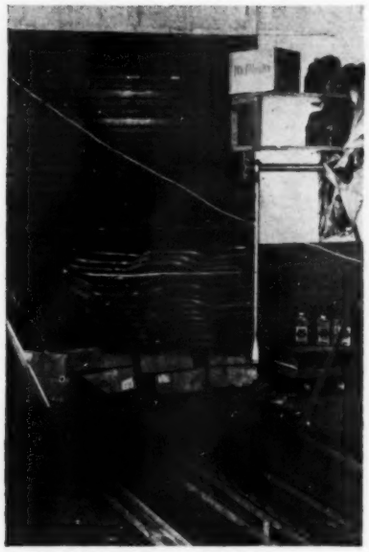
American Machinist

A McGRAW-HILL PUBLICATION



At the Barricades—Industrial sansculottes of C.I.O. stripe were ready for the forces of law and order. Weapons include boxes of hinges and pinch bars, with liquor to enliven proceedings. See page 606.

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McGraw-Hill Publishing Company Inc.

Publication office, 99-129 North Broadway, Albany, N. Y. Editorial and executive offices, 330 West 42nd Street, New York, N. Y. Branch offices: Chicago, 520 North Michigan Ave.; San Francisco, 883 Mission St.; Aldwych House, Aldwych, London, W. C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

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AMERICAN MACHINIST. Published every other Wednesday, price 35c a copy. Subscription rates—United States, Canada, Mexico, and Central and South American countries, $3.00 a year. All other countries (except Europe and British possessions, in Eastern Hemisphere), $6.00 a year or 24 shillings. Entered as second class matter, September 29, 1936, at Post Office, Albany, N. Y., under the act of March 3, 1879. Printed in U. S. A. Cable address "McGrawhill, New York." Member of A.B.P. Member of A.B.C. McGraw-Hill Publishing Co., Aldwych House, Aldwych, London, W. C. 2, England will serve with the European edition, all subscribers in Europe and British possessions in Eastern Hemisphere—subscription rate 35 shillings for one year.

Volume 81 — Number 14

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July 14, 1937

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AMERICAN MACHINIST is the preferred paper of production men in the metal working field.

More production men pay to read American Machinist than any other paper.

620.5 v. 81 pt. 2

American Machinist

Talking Shop

Tied Down

All punch presses installed in a new department of a large manufacturing plant are equipped with a safety clutch release that requires the use of both of the operator's hands. These devices have proven effective; there has been no serious accident since the department was formed. A recent report indicates that this safety record has not been without its share of luck.

One night the assistant superintendent made a surprise visit to the department. Everything was going well and the night foreman was quite pleased with himself until the two men rounded a corner and saw both the operating handles of a punch press tied down. The press was operating at its maximum speed, and the operator was feeding parts into the press as rapidly as he could, missing only a stroke now and then.

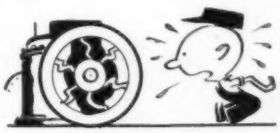
Safety devices are safe only so long as they are properly used. The responsibility of management does not end with the installation of this or that device, guaranteed to make the

operation of a machine safe. Only by constant supervision can the men responsible for the safe operation of tools and equipment be certain that the safety equipment provided is properly used.

What About Fits?

Press and shrink fits have been playing their part in machine work for many, many years. And yet it seems as though we still had a lot to learn as to the best allowance to be used, and the effect on the result. Wrought iron spoked driving wheels have had spokes bent by a cooling tire when the shrink allowance was too great. Fly wheel hubs have also been split from too great oversize on the shaft in press fits.

We ran into a case a while ago where the customer sent a ring and shaft to be shrunk together by a



heat-treating friend of ours. He wanted to be sure of a tight fit and so gave about four times the usual "thousandth per inch" allowance. Our friend told him it was a great mistake but was told to go ahead. The result was that the ring did not hold at all. The excess allowance had stretched the metal in the ring beyond the elastic limit and enlarged the bore so it did not hold on the shaft.

Silver in Switches

Every little while we run across a use of semi-precious metals in everyday construction. A year or two ago some automobile engine designers began to use silver in bearing metal mixtures, as an answer to the new and heavier duties imposed by high speeds and higher compression ratios. Now we find silver being used for contact surfaces on central station switches. Sometimes a sheet of silver is brazed or fused to the bronze backing. More often, however, the surface is electroplated with silver to a thickness of from three to five thousandths. The advantage claimed is that, even when the silver oxidizes, there is practically no increase in the resistance.

Little and Often

Lettering of a thin tube by stamping is not especially easy even when you can put a mandrel or anvil on the inside. But where there is no way of getting a support in the piece to be stamped it's a real problem. One bright mechanic discovered that he could do the trick by using a multiplicity of light blows. He took a little High Speed hammer and set it so that it would just touch the top of his stamp on the down stroke. It took a bit of experimenting but it's now a regular operation in that shop. And it's a good job of stamping too. Just goes to show that there's a way to do almost every job.

Putting Scrap to Work

Effective use of machine tool parts that would otherwise have been scrapped was called to our attention during a recent visit to the shop of one of the largest manufacturers of industrial gearing. All of the reduction gear units and geared-head motors assembled in this plant are put through a run-in test before being delivered to the warehouse.

Larger units are, of course, set up and tested on large bed plates imbedded in the floor of the shop.

Smaller units are placed on test tables that are mounted at a height that makes it convenient for the test men to work around them. The two tables used for this purpose are made of old cast-iron planer tables supported on structural steel and concrete foundations rescued from scrap.

—The Editors.

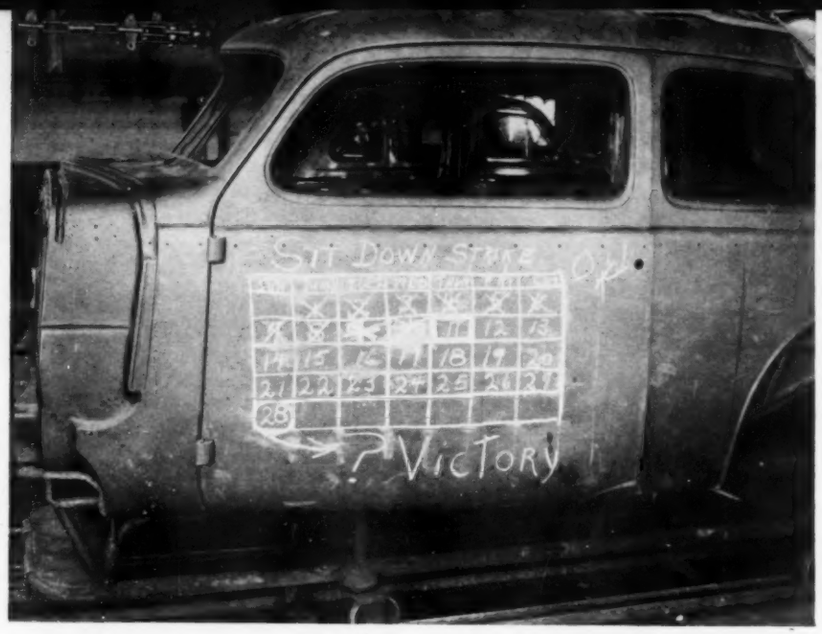
Localized damage. Just what this sedan body was used for is not entirely clear

As the sign indicates, this was a squad dormitory

After Sit-

What a plant looks like immediately after a U.A.W. army of occupation has moved out. Barricades and ammunition dumps vie with sleeping billets for destruction of company property. No wonder automobile executives look with exasperation on the Wagner Labor Relations Act which made all this possible

Some one evidently disliked the official who sat at this desk



Sit-downer's calendar with his victory estimate, evidently doubtful

Ready made clubs and a fire hose were available at this barricade

Downers *Leave*

An ammunition dump —chemicals in reserve

Improvised office of a division of the army of occupation

Forging Questions

How should the dies be designed? What must the metallurgist decide? What about heating? Should dies be greased?

L. T. WILLISON
Metallurgical Engineer
Jones & Laughlin Steel Corporation

A THOROUGH understanding of the principles followed in producing forged parts will indicate the possibilities of substituting forgings for parts formed by other methods. The first step, of course, in producing a forging is the die design. In this step, the engineer must consider:

1. What is the forging plane, that is: at what angle should the piece be forged to insure correct clearance and draft in the die?

2. Would the forging lend itself to multiple or group forging? Could more than one impression of the forging be made in one die? Obviously the overhead per unit is lower when three forgings can be made at one time with a single heating and one handling. The failure to consider this angle thoroughly is sometimes the difference between getting a job and not getting it when competitive bids are involved. The weight of available equipment must be considered in this connection, since overloading a hammer may be decidedly costly through excessive die wear; added blows required, which in turn reduce the life of the hammer; and the inability to produce consistently, forgings within the given tolerances.

3. Can the impressions be cut in obsolete dies? In the event old dies are utilized the forger has a decided saving to start with since it is customary for the customer to pay the initial die cost. The forge shop assumes the responsibility of recutting and furnishing of subsequent dies for the same part.

Metallurgical Questions

After such consideration the die design is then turned over to the metallurgist, or the department assigned to consider quality features. Where the forge shop is not favored with metallurgical talent or facilities, it may turn to the steel producer who today renders such assistance, particularly with reference to the steel quality and grade. The metallurgist's consideration of the problem at hand should include such points as:

1. How does the part function in service?

2. Is the die design conducive of correct grain flow? Will the flow lines of the original bar be left intact and unsheared?

3. Is the die design such that cold shuts in forging will be possible?

4. What grade of steel should be used and what grain size, if any, should be applied to give maximum machinability, minimum amount of distortion, best ultimate performance, etc. In the great majority of cases, the shop people prefer plain carbon steel over alloy grades, since fewer shop troubles are encountered on the former.

The Die Is Cut

When fully satisfied, the metallurgist returns the plans to the engineering department which then turns them over to the die shop where the die is cut. After sinking, a lead cast is made and submitted for approval. These lead casts are exact duplicate of the forging except for the difference due to shrinkage, which is taken into account. With approval of the lead cast, the job is ready for production. With the stock in hand, inspection is applied, where specified. This inspection will include any or all of the following determinations; chemical checks, generally for carbon only, but in some cases for other elements; visual inspection of the bars; and etch tests which are used to check segregation, surface, and density. As to the latter test, our own experience has proved that ingot pattern is sometimes looked upon unfavorably, while others are not so suspicious of pattern alone. There are others who look upon the etch test as a means of acceptance with an eye of suspicion since they are hesitant to pick satisfactory or unsatisfactory steel on this basis.

Approval of the steel makes it ready for cold-shearing to prescribed length. This step of the operation is sometimes used as a means of detecting piped steel. The bar or billet end condition is important in cold-shearing since multiple lengths are often figured to close weight tolerances with the result that distorted ends, particularly in billets, result in an underweight multiple and subsequent underfills in the forging. Cold-shearing is possible on billets up to and including 7½-in. squares, and in carbons up to 0.50, temperature being a factor for consideration in these high carbons of large sections. Extremely cold weather generally finds the shearman manipulating to obtain a partially heated billet.

Heating for forging, while probably equal in importance to any part of the forging operation, has not been given full consideration in the past. Too frequently, heating was looked upon as a means of changing the steel to a plastic state which would offer least resistance in forging without consideration for the metallurgical functions involved. The fact that many variations are found in heating practices and temperatures is not always attributable to the operator's lack of understanding, but rather to the noticeable lack of proper fuel introduction to the furnace, atmospheric and general temperature control equipment. Of the deviations from the proper and desirable temperature, the variation is obviously to the higher side since it makes for easier forging and minimizes die wear. Considering the fact that violations have often been found in the heating practices, it is little wonder that the source of steel supply has many times been looked upon suspiciously when forgings have failed to meet expected requirements.

In fairness to the forger it must be said that he now recognizes the importance of heating and is allotting time to the study of bar heating and its effect on the finished product.

With such consideration it is reasonable to assume that abuses of the past will be minimized with the result that an improved product will be forthcoming as the study progresses.

W. E. Jominy of the General Motors Research Laboratories, gives the following recommended maximum temperatures for forging:

	Recommended Maximum for Forging
SAE 1015	2400 F.
SAE 1030	2350 F.
SAE 1050	2300 F.
SAE 1090	2150 F.

(ASM 1936 Handbook)

With the steel brought to the desired temperature the hammerman is ready to take over his portion of the job. The handling procedure under the hammer differs with the design of the forging being produced. Where the part is such that metal displacement is irregular, the bar is first placed under the "fuller" portion of the die under which the hammerman strives to allocate the metal in line with the ultimate shape and flow requirements. It is important at this point that the flow be considered, since failures may result from improper fullering. While this operation is referred to as "fullering" it is commonly known in the shop as "rolling." After fullering, the bar is transferred to the edging impression where the bar assumes a more exact symmetrical shape. This may be referred to as edging, roughing or blocking, and will require from two to nine blows, depending upon the size and design of the forging and hammer being used. From the blocking operation, the roughed piece is placed in the finishing die and here it is merely a matter of centering the part and striking sufficient blows to insure the complete filling of the dies, both bottom and top. Here again the number of blows required will depend upon the equipment and part involved. Generally speaking, the average forging requires three to five blows under the finishing impressions.

The Grease Controversy

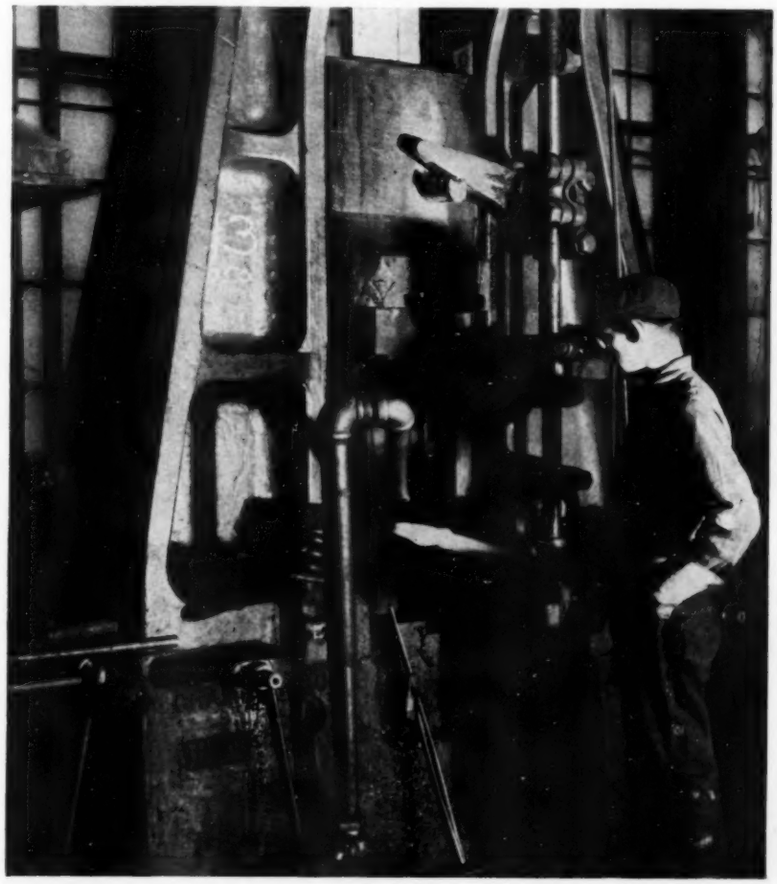
During the process of finishing, the hammermen in many shops will constantly apply oil or grease to the dies. The purpose of this is to prevent sticking and is accomplished by blowing the forging out, so to speak. As the hot metal is forced into the die by the blow of the hammer, the lubricating oil or grease is instantly gassified at high pressure and if the nature of the hammer blow is such that it is rapid in action, the gasses which are generated between the die and the hot metal are generally sufficiently high in pressure to eject the work from the die and thereby facilitate the hammerman's manipulation of the work. With this quick removal of the hot metal there is little burning in the finer sections of the die contours. However, there are some shops where grease or oil is not permitted on the dies, since it is the contention, and evidently well founded, that these resultant and repeated explosions tend to and do shorten the life of the die, in addition to which much of the die-checking experienced is traced to this practice.

Breaking Dies In

In the shops where grease is not used, special care is taken when the dies are first placed into service. This special care generally consists of breaking the dies in at a slow rate. After being thus broken in, those favorable to the no-grease method will claim a minimum amount of sticking and longer die life. On the other hand, the followers of the greatly-used grease practice will insist that the longer life obtained is not sufficient to compensate for the loss of production and special handling of the dies.

Throughout the entire forging operation under the die a steam or air jet is constantly being played on the die. The effect of this is twofold in that the resultant removal of scale reduces die wear and minimizes the imbedding of scale in the forgings, thereby greatly reducing the possibility of machining trouble caused by imbedded scale in subsequent operations.

At the completion of the forging it is passed along for trimming, which consists of trimming off the flash or surplus metal which was accumulated in the gutter of the forging dies. Flash, which represents scrap loss, may range from six to twenty per cent per unit, depending upon the design of the part. This operation is usually performed on a crank press and the dies involved must be carefully designed to preserve the contour of the forging. Trimming may be done hot or cold. While it is general practice to trim close, some forgings such as steering members are trimmed wide to avoid the possibility of minute cracks which in service might become stress nuclei. Considerably more difficulty is experienced with certain alloy grades than with carbon steel in trimming.



Each step of the forging operation must be conducted with a minimum loss of time and temperature to conserve the dies and assure proper metal flow

Standard Costs *Kept Standard*

Six weeks old costs prevent an intelligent post-mortem; by then the damage is done

J. K. MATTER
Aluminum Products Company

WE ARE all familiar with the usual method of determining costs after the shop work has been completed. When the actual cost figures are available, long after the work is finished, none of us are able to sit down and intelligently review the facts; we've lost interest in those figures and our thoughts are centered on the present jobs and their possibilities.

Harrington Emerson, after giving this matter a great deal of thought, wrote as follows: "There are two radically different methods of ascertaining costs; the first method, to ascertain them after the work is completed; the second method, to ascertain them before the work is undertaken. The first method is the old one, still used in most manufacturing and maintenance undertakings; the second is the new one, beginning to be used in some very large plants, where its feasibility and practical value have already been demonstrated."

The second method referred to by Emerson is now known as Standard Costs, or Budgeted Costs. I would define a Standard Cost as: "The cost of an article determined by computation of material costs, labor and burden rates, all of which have been taken from predetermined standards."

It is evident from this definition that preliminary work is necessary before Standard Costs can become a fact. Not only is preliminary work necessary, but an accurate and reliable follow-up system is required to make sure that Standard Costs remain standard.

Setting the Standards

W. A. Hastings, president of Aluminum Products Company, being familiar with the subject of Standard Costs and with the necessity of keeping them standard, has evolved a method of accomplishing these purposes.

In getting ready for Standard Costs, the first things we had to consider were, of course, production hours and labor rates. This called for motion and time studies of all, or, at least, a majority of the constantly recurring operations. When the studies were completed we had determined the best way of performing each job and the time in which it should be done. We also knew the rate we could afford to pay for it.

Distribution of overhead burden was the next problem. Our particular business is the manufacture of cooking utensils from aluminum and stainless steel. Some of the operations, such as making tea kettle bails, require very little overhead; other operations, such as torch welding, take a high burden rate, due to such items as the cost of hydrogen, oxygen and flux. Because of these diverse operations we decided to distribute burden on the basis of a machine-hour rate.

Based on Ten-Hour Day

Next, in order that the burden rates could be properly set, we had to decide on the length of an average day. If we distributed burden over a 24-hour day we would have had a nice low rate. On the other hand, we were not working 24 hours regularly, so rates set on that basis would not have been correct. A ten-hour day was finally selected as a normal base and burden rates were calculated on that basis. Ten hours averaged the days we worked our shops eight hours and the days when operations extended over the full twenty-four hours. The ten-hour day base also saved us from the problem of having a large unabsorbed supplementary burden account.

Product Standardization

While we were determining the proper standard costs we also analyzed our product. We were somewhat appalled to discover that we were attempting to manufacture, service and stock some 600 items. It didn't take a genius to convince us that this variety was entirely too great for our organization to handle. None of us could see our way clear to maintaining standard costs for that large variety or to maintaining supplies of purchased and manufactured parts to keep each item alive.

After careful study we found that many of the items could be eliminated. We found, for instance, that we were making 36 different one-quart sauce pans. Some had round beads and some had square beads;

some handles were of tinned steel, some were of bakelite; some had straight sides while others had tapered sides. Each of these sauce pans would hold one quart; none of them would hold more than a quart.

The axe was swung, when we were through 600 items had been reduced to 54. We have found it enough.

Our ground work had now been completed. The product, production and labor rates had been standardized. Burden was fairly distributed. So we compiled our standard costs and put them into effect.

Getting Our Money's Worth

Coincidental with the introduction of standard costs, we introduced our superintendents to a new report. This report was designed for the sole purpose of keeping a constant check on these standard costs and it has proven effective.

While most cost-reports are post-mortems, this particular report is alive. It is in process of compilation during the entire day and is on the president's desk every night before he goes home. It tells the story when it happens and so has proved to be a destroyer of alibis and a producer of results.

The report illustrated is taken at random from one day's production. Some of the information comes from time cards, some is available in the shop superintendent's office. The production record comes from the wrapping department.

Under descriptive items is listed the name of the article. The next column gives our catalog number for identification purposes, while the third column gives the gage of the metal from which the article was manufactured. This gage is important to us as the thickness of the metal has an effect on the amount of labor involved.

Production for each item is recorded in the fourth column.

The left-hand figure under column *A* is the weight in ounces for each item of that class. This weight multiplied by the quantity produced gives the total weight of all items of that particular product made during the day. This total weight is recorded as the right-hand figure under column *A*.

Column *B* shows the standard direct labor allowance or cost for both the individual item, left, and the day's production, right. The right-hand figure is obtained, of course, by multiplying the value in the left-hand column by the number of pieces produced.

The left-hand figure under column *C* is the standard cost, complete, for one item of that class and its companion figure on the right side is the total standard cost of all of those items manufactured during that day. The total of column *C* for this particular report is shown as $980.31. In other words, $980.31 worth of labor, material and burden were produced that day.

Total wages allowed as per our standard costs for this day were $160.44. This figure was obtained by totaling column *B*. The time card payrolls for direct labor for that day were $156.99. In other words, we allowed $160.44 to make our product and the checkbook shows that we spent $156.99. Simple, but effective; and the checkbook doesn't lie.

Our payroll for indirect labor that day, taken from the time cards, was $57.71. The ratio of indirect to direct was 36.8 per cent. For us, that is rather high and is caused by the fact that this was a very small day's production.

The total weight of aluminum used that day was 1,816 lb. This figure divided into $980.31 gives us the cost per pound or $0.5398. The cost per pound is one of our best cost indexes and its daily fluctuation is extremely important.

The direct labor cost per pound of metal produced as shown by the checkbook is $156.99 divided by 1,816 or $0.0865 per pound. This particular figure is very high for us and is due, as may be readily seen, to the fact that we made up nineteen special milk pails that day at rather high costs per pail.

The money allowed in our standard costs must equal or exceed the money spent for direct labor as shown on the time cards. We balance those figures daily and every discrepancy must be explained satisfactorily when it happens. The report is made out before anybody goes home and the sad story, if it is sad, is known immediately. The figures are alive and up to date. What is really important is the fact that this report brings results. It works.

Metal Rolling & Stamping Co.

DAILY PRODUCTION RECORD

Date Apr. 24, 1936

DESCRIPTION ITEMS	Official Catalog No.	Gauge	Number of Each Item Produced	A SCALE WEIGHT OF ITEMS (ozs.) Each	A Total	B DIRECT LABOR COST ONLY Each	B Total	C PACKED COST (All Labor and Materials for Product, Credit) Each	C TOTAL
Milk Pail	9011	8	3	152	456	1.50	4.50	5.82	17.46
" "	9010	8	16	124	1984	1.1455	18.33	4.6386	74.22
Double Boiler	224	23	182	13	2366	.0592	10.77	.3191	58.07
Army Cup	1148	12	700	7	4900	.0285	19.95	.1660	116.20
Gov't. Sauce Pan–1½ qt.		8	265	37	9805	.1632	43.25	.95	251.75
Jug Inserts–1gal.		23	900	7½	6750	.0264	23.76	.1756	158.04
Percolator	5161½	20	100	13	1300	.1421	14.21	.6182	61.82
Stock Pot S.C.	5768	18	50	30	1500	.1213	6.07	.855	42.75
Zephyr Jugs	7000		400			.049	19.60	.50	200.00

TOTAL POUNDS ALUMINUM ..... 1816 LBS.

TOTAL COLUMN "C" $ 980.31

PERCENTAGE OF DIRECT LABOR TO PRODUCTION 16 %

DIRECT LABOR COST PER POUND $ 0.0865

TOTAL WAGES PER COLUMN "B" $ 160.44

TOTAL COST PER POUND $ 0.5398

Timecard Payrolls for Direct Labor $ 156.99

K.W. Hours Used: .....

Timecard Payroll for Indirect Labor $ 57.71

PERCENTAGE OF INDIRECT TO DIRECT LABOR 36.8 %

Plug cocks made today show practically a full bearing when treated with Prussian blue

Progress in Plug Cocks

FRED H. COLVIN
Editor

PLUG cocks have long been an important member of the valve family, especially for handling liquids. The old cider barrel and the beer keg with wooden spigots were probably the forerunners of the modern water and gas cocks that are now so common. They were old when I was in the shop back in the '80's, and they were a pest in many ways. The interrupted cut, due to the slot or opening in both the body and the plug, gave plenty of trouble.

When made in the Fox lathe the body was bored by setting over the tailstock and using the regular single-point boring tool made by forging the point to one side for clearance. The plug was turned between centers. In both cases the slot caused the tool to jump, and it was hard to get holes or plugs that were round and had a good bearing. The body was sometimes reamed for finishing. Taper reaming is bad enough at best, but these conditions left much to be desired. Then came the "grinding in" or lapping, sometimes by special machines, more often by hand.

The Art of Lapping

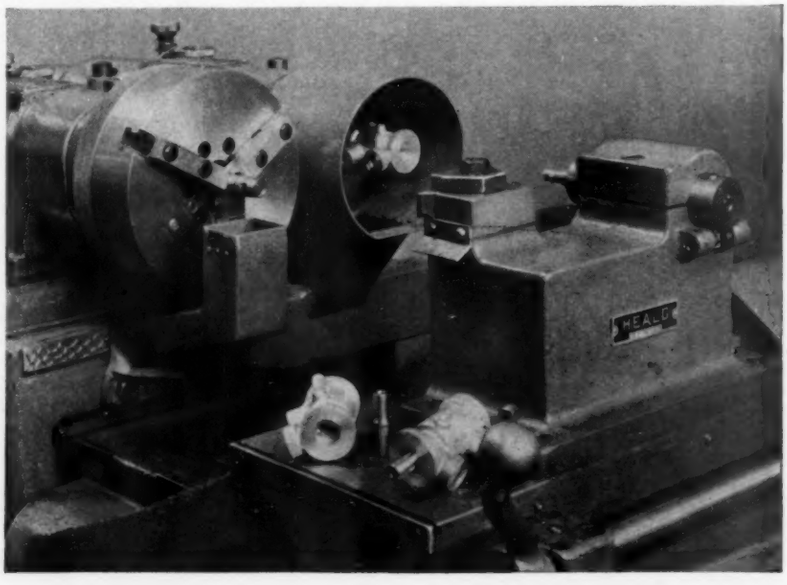
This lapping was an art in the eyes of the cockmaker. The theory was that the plug should not revolve continuously but should be rotated one way, then reversed. Some claimed that it should not rotate a full turn, others that a turn and a quarter or a half was better but not more. And once in a while there was a man who would give a finishing touch by spinning the plug lightly in the body.

The abrasive was another point of argument. Much of the emery obtainable (and emery was the abrasive then used) was too coarse for a really nice job. So it was quite common for the cockmaker to locate a bank of earth somewhere that was sort of a cross between sand and clay—a very fine grit but with a smoothness that prevented scratches. Sources of this abrasive were kept a deep secret.

Such methods are no longer necessary. Single-point boring and turning with new cutting tools and machines and spindles that do not vibrate have made both the reaming and the lapping unnecessary. To be sure the Fox lathe used single-point tools, but neither the machine nor the tool were stiff enough to prevent vibration. Tungsten carbide tools, high speeds and light cuts make it possible to bore the bodies and turn the plugs so well that they are now assembled as they come from the machines.

They Stand the Test

The plug cock parts shown pass an inspection test with water at a pressure of 98 lb. per sq.in. For such work the Robertshaw Thermostat Company uses a Heald Bore-Matic machine which removes chips by a vacuum pump after finishing.



In this double set-up one spindle takes care of the plug and the other the body

Jig Fastenings *and Equalizers*

XII — Equalizing clamps of various forms must be used in some drill jigs and milling fixtures to grip the work securely regardless of thickness variation

C. W. HINMAN
Tool Engineer
Kobzy Tool & Electric Manufacturing Company

A TYPICAL application of the wedge principle consists of milling an angular slot along the longitudinal center line of a straight key, Fig. 92. This is simply an internally tapered key in principle, and is useful in cases where the work has a large hole that is slid over a stud in the jig. The sketch shows the key in its locked position. To unlock and remove the work, the key handle is raised until it can be turned down horizontally in line with the stud, and the piece is removed over it.

A tapered key is a reliable fastening when used either directly against the work, as in Fig. 93, or applied across a jig for securing a closed leaf. Tapered keys are generally used in connection with large tools, but in any case they have two serious faults. If care is not used, they may be driven too tightly and thus score or even fracture the work. A mallet or other hand tool is necessary for tightening or loosening keys, and this slows the operation. The first fault can be entirely avoided, however, by a careful operator. The second fault can be overcome in cases where it is practical to adopt the internal-type key described under Fig. 92.

Inverted shouldered drill bushings are used in Fig. 93, and the work is registered in contact with the bushing heads by the key pressure in the stud. In both Figs. 92 and 93, the long gaging stud is relieved to facilitate slipping the work on and off, and to clear chips and grit. Similarly in the design of screw bushings, it is best to provide one or more equally spaced slots cut lengthwise through the threads to clear particles of grit, Fig. 94. This screw bushing can be operated very much easier than without the slots, especially when the threads are fine.

Principles in Equalization

A pair of opposed equalizing clamps is presented in Fig. 95. These are operated by the underslung equalizer bar *A*, outside the tool body. When the nut is tightened the two vertical pins operate in compression. This action forces each clamping face to grip the work independently, regardless of thickness variations. Each of the clamping faces bears against the other by means of the vertical pins and the equalizer bar. When the nut is loosened, compression springs *B* force both clamps to free the work. Another possibility in this design is to use an eye bolt pivoted in *A* at *C*, causing it to operate in opposed tension against a similar bolt at the other end of the equalizer bar. In this case the clamps must be rearranged accordingly.

Fig. 96 is a sketch for a pair of equalizing tongs for thin work. These tongs will clamp and centralize the work when the ball-handled nut is tightened. This device serves three purposes: it clamps, centralizes, and draws the work down simultaneously.

Fig. 92—A pin in the stud and an angular slot in the handle wedge the work firmly in the jig

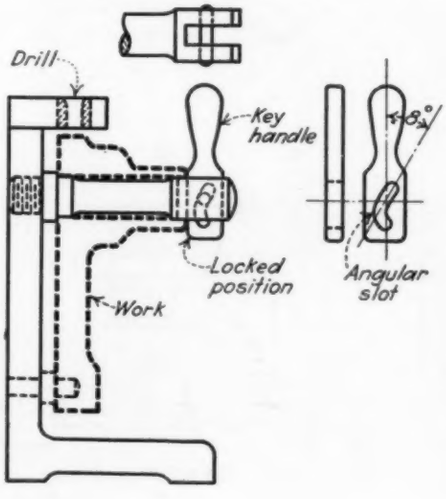
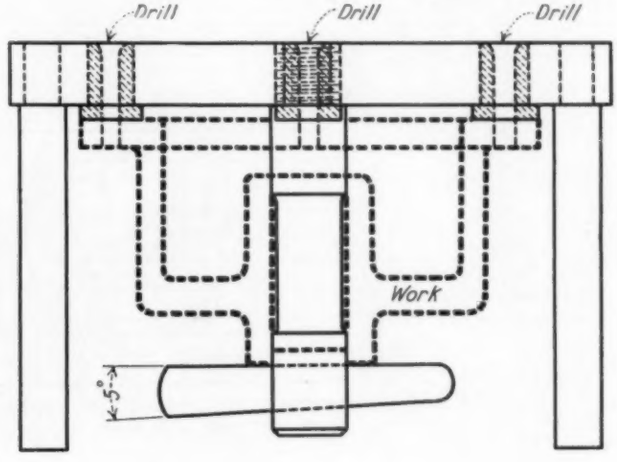


Fig. 93—Care must be used with a tapered key fastening, or else the work may be scored or fractured



Loosening the nut allows the spring under the recessed washer to act instantly in separating the jaws. This design is well adapted for holding and centralizing circular work. Three clamps are equally spaced around the circumference of the piece, and terminate beneath, as shown.

Compensating Equalizer

In Fig. 97 is a popular design for small channel drilling jigs. The reinforcing ribs extend lengthwise atop the jig body instead of underneath it. This feature allows the floor of the jig to be easily swept of chips and oil. The work, a steel forging, is machine finished on its sides, ends and registering face. There are variations at the clamping thicknesses. Hence for the design of a speedy tool, a compensating equalizer is attached to the leaf by a "floating screw" in a "wabble hole." The equalizer supports the work directly under the drilling thrusts. It is relieved on four sides to a central seating point, which makes possible an equalized support regardless of any reasonable irregularities in the work. Width equalization, across the jig, is provided by the single bearing points on the equalizer, under the drills, section *A-A*. The latch, an eyebolt and wing nut, has a hardened wear plate under the nut. The eyebolt checks against the leaf slot throat at 30 deg. when fully opened.

Fig. 94 — Lengthwise slots through the threads of screw bushings will clear chips or dirt

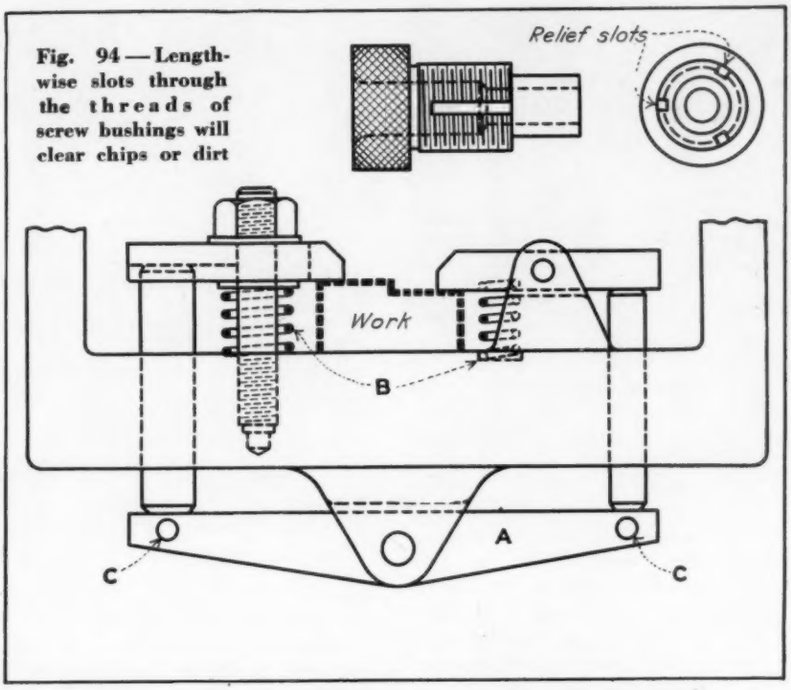
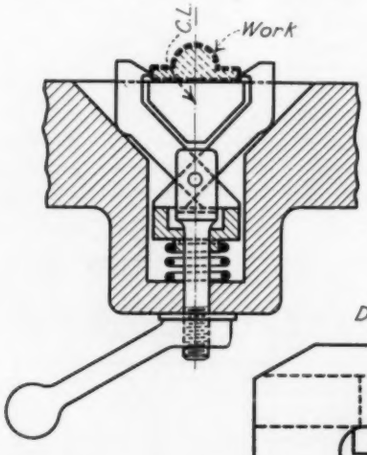


Fig. 95—Pressure applied by the nut is equalized on both clamps by means of the two pins and the rocker *A*

Fig. 96—Thin work, and even circular work, can be held securely with a pair of equalizing tongs



There are other designs for handling pieces of this character that use a latch hook and work binding screws through the leaf. These designs necessitate extra handling in loading and unloading, and are therefore too slow in operation. In this case the hinge pin is straight, and is a press fit in the jig body and a slip fit through the leaf. In jigs where no accurate drilling is done through the leaf, wear bushings around the hinge pins are unnecessary. A good substitute for wear bushings, when necessary to have them, is to use a tapered hinge pin. Wear is then quickly adjusted by simply redriving the pin.

A compound equalizer that compensates for thickness variations in four pieces of work in one "strike" is given in Fig. 98. Consider cost and output before attempting to design a jig for multiple drilling. It is known that a jig for handling four or six pieces in one "strike" does not produce anywhere near twice nor three times the output of a two-piece jig, in the same period of time. The extent to which multiple drilling can be profitably carried on is frequently misjudged. While six pieces can be ejected from a jig as quickly as two, yet the loading time, placing the jig and drilling six pieces in one "strike" is often more than three times greater than for two pieces. Add to this the extra tool cost and setting-up expense, and with a more cumbersome jig to handle, the supposed gain is

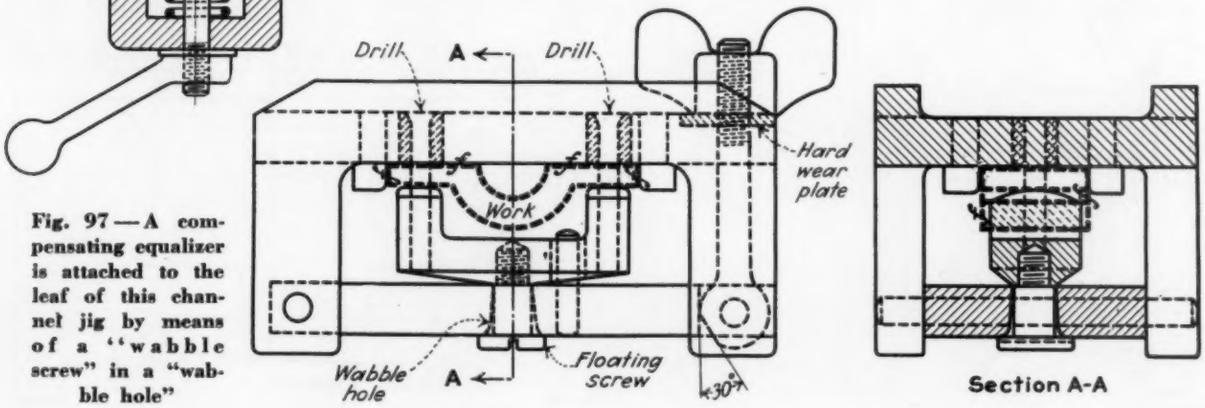


Fig. 97 — A compensating equalizer is attached to the leaf of this channel jig by means of a "wabble screw" in a "wabble hole"

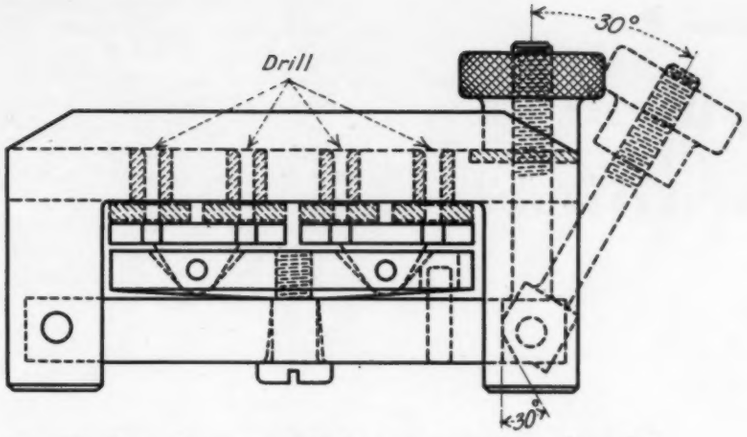


Fig. 98—Four pieces are held by a compound equalizer, but the extent to which multiple drilling can be profitably carried out is often misjudged

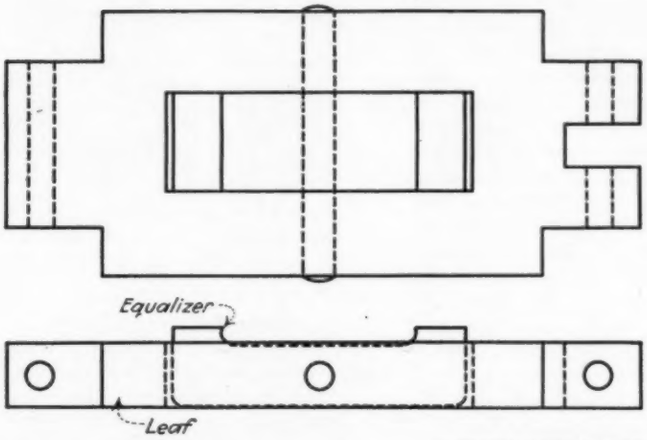


Fig. 101—To avoid an abnormally high jig, lower the equalizer into the leaf

very likely to vanish. There is no economy in multiple drilling when the "floor-to-floor" time equals or exceeds the "floor-to-floor" time for drilling one part, multiplied by the number of parts produced by one strike in a multiple jig.

Three-Point Support

If a three-point, in-line support is necessary on varying work thicknesses, the equalizer design presented in Fig. 99 is used. This jig uses a scalloped-head, cast-iron nut for tightening the draw-bolt and leaf. This nut provides a more efficient hand grip than a knurled-headed nut.

For three-point bearing, in an out-of-line support, the equalizer design in Fig. 100 is used. The three supporting pins can be placed in any required positions.

When placing an equalizer on a leaf, and it is found that this design builds up the jig normally high, the solution is to lower the equalizer entirely within the leaf, as shown in Fig. 101.

In a coming article on the subject of milling fixture equalizers, the subject in hand is continued. Milling equalizers are sometimes made for clamping five or more pieces in one cut. Multiple milling is usually economical, while multiple drilling is not often so. The difference lies in the fact that multiple milling is economical because the cutting interval usually far exceeds the loading and unloading time. These statements hold good only in fabricating light interchangeable parts, and are obviously not intended to apply in drilling and milling heavy parts, similar to automobile engine blocks in mass production.

Centralizing Work Pieces

The following article presents the subject of centralizing work pieces in drilling jigs. Many of these principles can also be practically applied in designs for milling and assembling fixtures. Some of them are useful for centralizing the strip width when feeding it into a blanking die.

Part XIII of Mr. Hinman's series on tool design will appear in an early number.

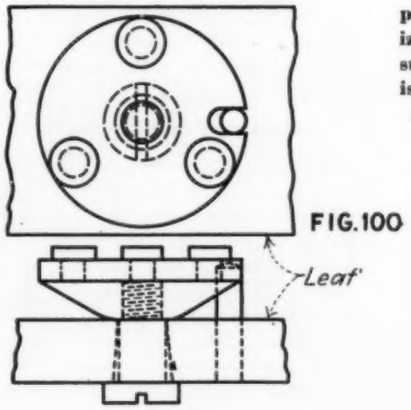
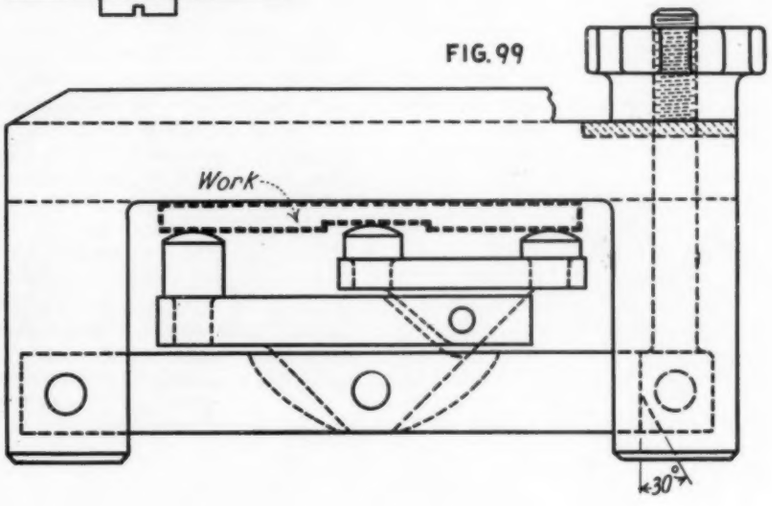


Fig. 99—Three-point, in-line support is taken care of by this equalizer design. Fig. 100—Three-point support in an out-of-line condition is provided by three pins disposed at required positions in a circle



When Is New Equipment Justified?

W. P. KIRK

Pratt & Whitney Division,
Niles-Bement-Pond Company

MOST PEOPLE today believe "more people want more things." If we want to contribute our bit to help them and want to make a profit while we are doing it, then we must realize that production efficiency is dependent upon proper equipment. We must put our factories in condition so that each worker can produce more and better things during his hours of daily employment and we, as producers, must pass on to the consumers a share of the saving due to improved facilities.

Cost System

If we are to get the most out of our investment in factory equipment, we must have some kind of a system for keeping costs. In this system will be a rule for writing off depreciation so that we can get back in our cash account the money that was invested in our present equipment as soon as, or before, it is necessary to make replacement.

It seems that too many concerns do not realize:

1. That the purpose of depreciation is to get back in cash account the money that was originally used to purchase the equipment that is being depreciated.

2. That writing off depreciation reserve and proper replacement, will lead to embarrassment and perhaps disaster when they discover that there are no reserves for replacement when that is necessary to meet the competition that has followed a sound depreciation and replacement policy.

The money put into original equipment is an investment. The depreciation allowance that is set aside is for the purpose of getting that money back so that it can be used over again when replacement is advisable.

A parallel case is that of a salesman who received ten cents a mile for operating his automobile in his company's use. The actual cost of operation was only five cents per mile. At the end of 20,000 miles he might have had $1,000 toward a new car, but he did not have it as he had spent it for other purposes each month when he received his expense check. Like many manufacturing concerns, he considered the extra five cents per mile as "profit." However, this individual woke up in time to save some of the extra out of the second 20,000 miles operation, even though the car was one year older and needed repairs and service (maintenance). He will not get caught that way again.

Generally speaking, the purchase of new equipment is justified when doing so will contribute materially in helping the concern to maintain or to advance its position in its particular industry, either by reducing its costs, or by improving the quality of its product, or by doing both.

Justifying Replacement

Replacement cannot be made in a wholesale manner. It is not sound to say that every machine must be replaced in, say, ten or even fifteen or twenty years. Replacement is an individual thing. A study must be kept of each machine so as to know its productive ability and cost of obtaining it and expense in keeping it in operation. We all know of cases where it has been advisable to replace a comparatively new machine in one year, because that type has been superseded by a more efficient model, or because a change in design of the product has eliminated a certain operation and the need of the machine. It is for such reason also that a flat rate of depreciation is not always safe.

Sometimes the justification for a purpose is confused with the question of "how to get the money to pay for it." "Justification" is a cost of production matter. "Getting the money" is a management matter.

Without getting involved in complicated formulas, let's say that the purchase of new machinery is justified when the savings obtained by its installation will absorb the depreciation and other annual items that are chargeable to the cost of the product. Profit to be made is not chargeable to depreciation.

In calculating the return on the investment in the new machine and comparing it with the old, the same factors must be used. In this comparison the annual report of the old and the new equipment must be the same.

All of these go into the cost of the product:

- Depreciation
- Insurance
- Taxes
- Maintenance and Repairs—down time
- Power
- Rent—floor space
- Operating costs—labor—oil, etc.

Note—Important items:

- Improved quality in product
- Lower inspection losses
- Less waste in machining
- Intangible but important — Safety, Mental attitude of operators

The industrial concerns that will be in successful operation in ten or even five years from today will be those that today are doing everything possible to get a better understanding of the necessity of keeping their manufacturing equipment up to a high standard of efficiency, of having expert knowledge, not only on equipment, but on depreciation and taxation and how today's tax laws will affect the future of our industries for many years to come.

Wanted: A Plan

What is wanted is a plan by which the shrinkage in the useful value of the asset may be charged into the cost of the product. The total depreciation which will take place during the useful life of the asset is the difference between the original value and the value at the end of its useful life for the purpose for which it was obtained.

If depreciation reserve estimates are fairly accurate, it should not be difficult to make replacement studies which will be good guides to tell us when new equipment is justified—that is, to answer our replacement problems.

Abstracted from an address before the Northern New Jersey Chapter of the Society for the Advancement of Management.

Ideas from Practical Men

Corner Rounding Fixture for Abrasive Wheels

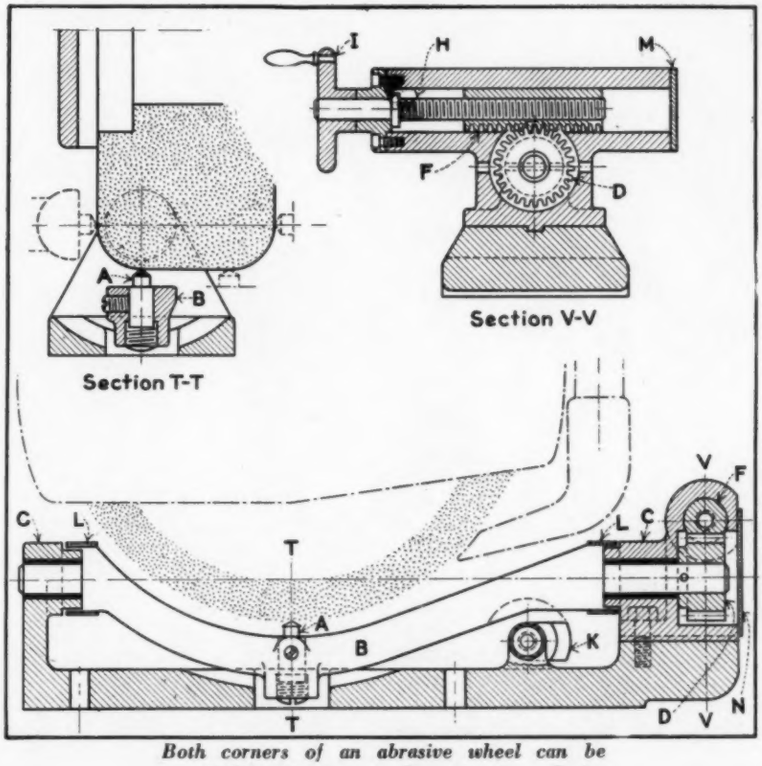
J. R. WHITTLES

Illustrated is a fixture for rounding the corners of abrasive wheels. It can be mounted either on a magnetic chuck or directly on the table of a surface grinder.

The diamond setting *A* is held in the center of the yoke *B* by a setscrew at the side and can be adjusted by a screw underneath. The yoke has trunnions at the ends resting in the bearings *C*. Pinned to an extension of one of the trunnions is the spur gear *D* which is operated by the rack *F* through the screw *H* and the handwheel *I*, the arrangement being similar to that of the tailstock of a lathe. The rack is cylindrical in shape and the teeth are cut in the under side only. The fixture is positioned so that the yoke swings beneath the abrasive wheel.

It will readily be seen that when the handwheel is turned, the rack will be moved endwise by the screw and will transmit motion to the gear, thereby causing the yoke to swing in its bearings.

The radius of either of the rounded corners of the wheel can be slightly lengthened or shortened by adjusting the diamond setting in or out.



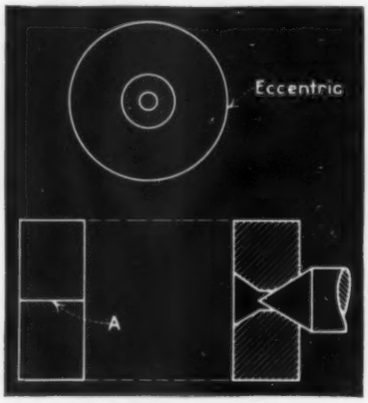
Both corners of an abrasive wheel can be rounded by this fixture. Provision is made for dressing the straight part of the wheel face

The yoke can be locked by the circular wedge *K* engaging a tapered slot, so that the straight part of the face of the wheel can be dressed by operating the cross-slide. Splash guards at *L* and covers at *M* and *N* prevent entrance of grit and dirt to the bearings.

Lathe Centers Aligned by Eccentric Collar

H. MOORE
Leeds, Yorkshire, England

For setting the tailstock center so that the lathe will turn straight, the eccentric collar illustrated will enable



Using this eccentric collar in the manner described will enable the workman to set the tailstock center so that the lathe will turn straight

the user to do the work quickly and accurately. The collar is deeply countersunk on both sides and is turned slightly eccentric on the outside, the line *A* being scribed at the high point of eccentricity.

In use, the collar is held on the headstock center by the hand and a sharp pointed tool in the toolpost is run until its point contacts the collar at the scribed line. The collar is then transferred to the tailstock center and the carriage is traversed to bring the tool opposite to it without disturbing the setting of the tool. The collar is then rotated while the tailstock is adjusted until the point of the tool stops the collar from ro-

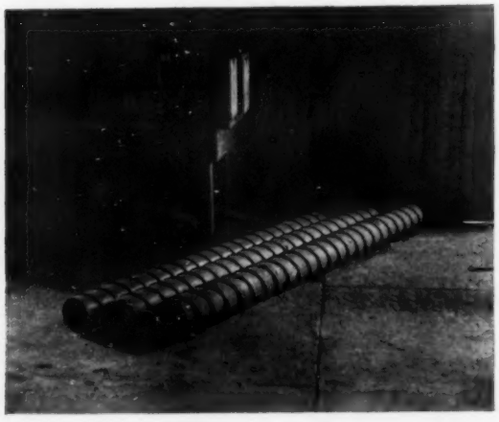
tating when at the scribed line. The centers are then in alignment and the lathe will turn straight.

Making Screw Conveyors in the Lathe

CHARLES F. HENRY

Screw conveyors date back well over 100 years. Oliver Evans illustrated them in his book on millwrighting published in 1807. But it remained for a Florida mechanic to make them by welding a ⅜ in. round steel rod around a 6-in. steel tube—at least so far as either of us knows. Three of these conveyor screws are shown on the floor in the illustration.

Unfortunately I could not get a picture of the job being done, but the method was simple. The lathe was driven by a pulley on the lead screw instead of on the cone. The lead is 8 in. and two rods are used to make a double thread. The rods ran through bronze V-blocks set in the toolpost opening at right angles to the helix of the coil. The end of the rod was



tacked to the tube with a welding torch.

Then the lathe was started with the power applied to the leadscrew as stated. Tension was applied to the rod by the toolpost screw so that the rod hugged the tube very tightly. When the rod reached the other end of the tube it was welded again. This was repeated for the second rod and the whole job was done at a very satisfactory cost.

Oddly enough I saw a lathe rigged in a similar manner at the John Bertram shops in Dundas, Canada, about 25 years ago. This was not for spring winding however (which is what this conveyor job amounted to) but for cutting a very fast thread for a special purpose. Driving a lathe through the leadscrew occasionally has uses of this kind.

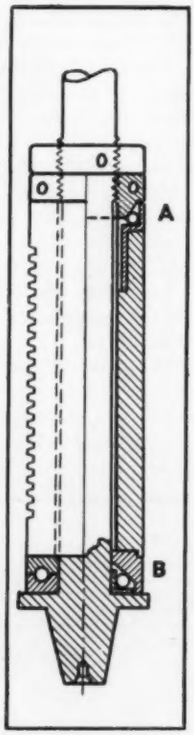
Taking Up Spindle Wear in a Drill Press

L. F. SOUTHWICK

Both the spindle and the quill of my sensitive drill press became so worn that drills wabbled, countersinks chattered and accurate spotting was impossible. Adjustment for end motion was provided for by the usual collars on the spindle, a ball thrust bearing being at the lower end, but there was no way to compensate for wear between spindle and quill.

The quill was rebored for clearance between it and the spindle and both top and bottom were recessed to receive ball bearings of the cup and cone type, as shown at *A* and *B* in the sketch, which is of the before and after type. The spindle now runs on ball bearings, both of which take thrust and radial loads, and the one adjustment takes care of both side and end play. The drill press now runs quietly and can be run up to 4,000 r.p.m. for light drilling and will push a ¾-in. drill through cast iron or cold-rolled steel at slower speed—and countersinks do not chatter.

The cups and the cones may be hardened and ground if you are fussy. I made mine of steel that had been heat-treated.



The quill was rebored to clear the spindle and ball bearings of the cup and cone type were applied at both top and bottom

The rubber of a Fuller bibbcock placed over a hexagon wrench makes a good grip

New Use for Fuller Bibbcock Rubbers

FRANK BENTLEY

The small L-shaped hexagon wrench used to tighten or loosen safety setscrews is not easy on the fingers, especially if it is used hundreds of times a day.

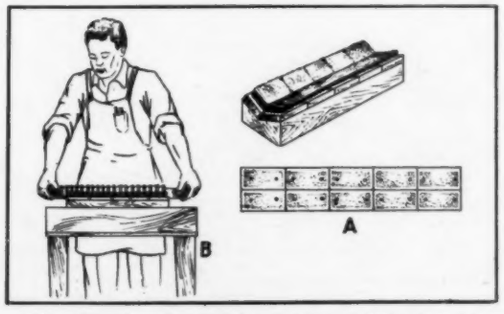
To make the wrench comfortable to the fingers, I put the acorn-shaped rubber of a Fuller bibbcock on the long end, as shown in the illustration. Such rubbers can be had in a number of sizes and one having a hole small enough to fit snugly over the wrench can easily be found. The octagon shape of the wrench prevents the rubber from turning. The rubber affords a comfortable grip and makes it easy to pick up the wrench when it has been laid down on a flat surface.

Brush for Cleaning Large Broaches

BRUCE McINTOSH

A long brush made by screwing a number of ordinary-sized scouring brushes to the sides of a long wooden V-block or trough, as at *A*, makes an excellent device for quickly cleaning large broaches.

Instead of going over the broach with a small brush, the broach is laid in the trough formed by the scouring brushes, as at *B*, and is rotated and at the same time is moved back and forth endwise to clear it of chips.

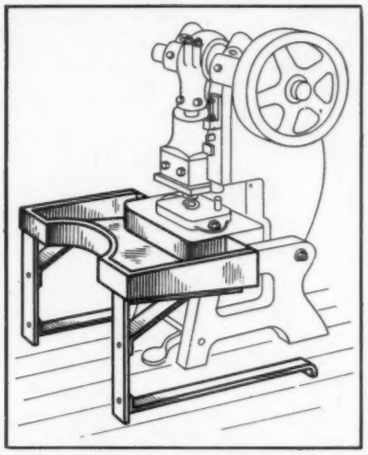


The broach is rotated and moved back and and forth endwise quickly to clear it of chips

Tray for Small Parts Speeds Work

CHARLES H. WILLEY
Superintendent of Manufacturing, Hoyt Electrical Instrument Works

When the operator of a stamping press is provided with a convenient tray at the front of the press to hold a generous amount of the small parts being operated upon, he not only likes



A tray at the front of a press is a convenience for the operator

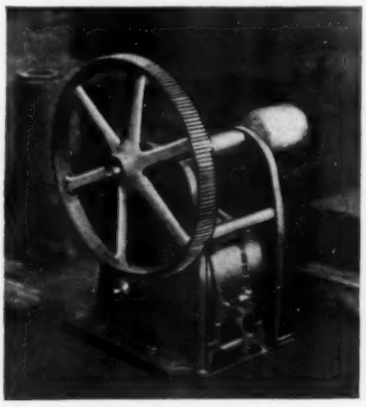
it, but it helps him to speed up production, especially on piecework.

We have made and installed several trays of the type illustrated and have found that they aid in orderliness of the press department and that they were well worth the cost of making.

A Home-Made Speed Reducer

FRANK C. HUDSON

Give an up-to-date railroad shop foreman a good electric motor and he gets busy with the cutting torch to turn it into a speed reducing unit to drive cylinder boring bars and the like. The illustration shows how one such foreman made a good speed reducer at a total cost of about $30.



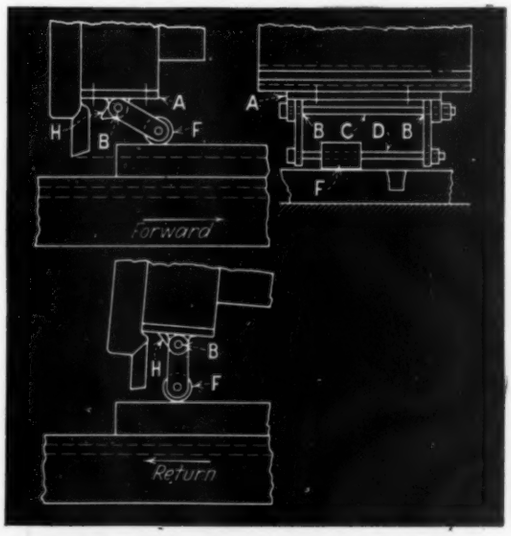
He cut a base plate and side plates as shown. These side plates were welded to the base and braces put between the sides. The upper brace carries bearings in each end for the upper shaft with the large gear on one end and the belt pulley on the other. The motor was bolted between the sides with its pinion meshing into the large gear. The whole outfit is portable and can be held in position by weights on the base extension if desired.

Roller Lifts Planer Tool on Return Stroke

J. T. TOWLSON
Enfield, Middlesex, England

For lifting the tool out of contact with the work on the return stroke of the planer, the device illustrated is unfailingly efficient. It was designed for use in planing molds for V-belts, where the tool dragging in the grooves would damage their surfaces, especially when the finishing cuts were being taken.

Referring to the illustration, the position of the device is shown during both the cutting and return strokes of



To prevent damage to the work by the dragging tool, this device automatically raises the tool clear of the work on the return stroke of the planer

the planer. It is attached to the bottom of the clapper and consists of the bracket *A* carrying two links pivoted at *B* on rod *C*, the links having at their lower ends the rod *D* on which runs the fiber roller *F*. The roller can be positioned endwise on the rod at the will of the operator.

On the forward or cutting stroke, the roller contacts the end of the work, rotating the links backward on their pivots so that the roller rides idly on the surface of the work. As the tool leaves the work at the completion of the cutting stroke, the roller drops and the links straighten. As the return stroke is commenced, the roller contacts the end of the work and, since the links are prevented from rotating forward by the stop *H*, the clapper and the tool are automatically raised, the roller riding on the work and bearing their weight without marring the work.

When not needed, the device can readily be removed by taking out the rod on which the links are pivoted at the bottom of the clapper.

Prolonging the Life of a Leadscrew

H. F. MISENER

All machinists know that the leadscrew of a lathe becomes worn and inaccurate near the headstock from constant use in short threading operations.

Recently in making two screws for a graduating machine, each about 30 in. long, I found that the worn leadscrew caused such a great error in lead that the screws were worthless and new ones had to be made.

As a new leadscrew is rather expensive, I solved the problem in the following way: Cutting off the blank part of the screw at the threads, I reversed it and turned down what was now the tailstock end for a bearing. Then I connected the blank part that had been cut off with what had been the tailstock end by a sleeve coupling, making a press fit at each end. Holes were drilled and taper reamed through the coupling and the screw and taper pins were driven in, the ends being cut off flush with the coupling.

This, of course brought the little-used part of the screw next to the headstock, making for all intents and purposes a new lead screw. The screw was, of course, shortened by an amount equal to the thickness of the tool used in cutting off the blank part, but that was negligible as it shortened only slightly the bearing at the tailstock end. Now, accurate work can be done on the lathe.

Gage for Checking Driving Wheels

F. M. A'HEARN

Referring to the article by J. J. Thompson under the above title (*AM*—Vol. 81, page 174), the gage described is a very good one. However, to avoid a misunderstanding, I wish to call attention to an error in Mr. Thompson's illustration. The tires are shown with their flanges at the wrong side, that is, outside of the rails instead of on the inside.

It may be well to add that although pairs of tires vary in spread, it should not be taken to indicate a wrong condition. On locomotives having long wheel bases it is common practice to set the tire flanges on the front and rear drivers 4 ft. 5⅜ in. back to back, and the flanges on the tires of the intermediate drivers 4 ft. 5¼ in. Engine truck and trailer truck wheels may be found with 4 ft. 5⅜ in. spread but not over, nor less than 4 ft. 5¼ in. In no case should the spread exceed 4 ft. 5⅜ in. or be less than 4 ft. 5 in.

When a driving wheel loosens on its axle fit, the looseness is usually indicated by separation of the paint at the outer end of the fit. Also, oil and grease work out around a loose fit.

Expanding Stub Mandrel

R. G. HEWITT

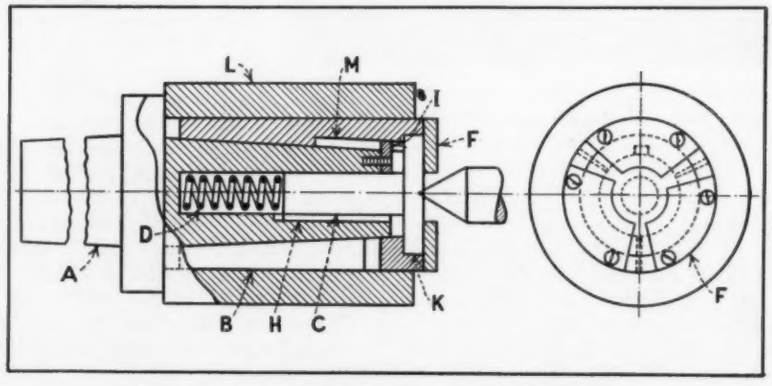
Huddersfield, Yorkshire, England

In the illustration is shown an expanding stub mandrel, one of the features of which is that it can be loaded and unloaded without stopping the lathe.

Essentially the mandrel consists of the body *A*, split bushing *B*, plunger *C*, spring *D*, three segments *F*, key *H*, and stop *I*. The inner end of the body is tapered to fit the hole in the lathe spindle and the outer end is tapered to suit the tapered hole in the split bushing. It is also bored to receive the plunger and the spring. The split bushing has an annular recess at *K* to receive the head of the plunger, which is confined therein by the three segments.

In operation, the part *L* to be machined is placed on the outside of the split bushing and the tailstock center is brought into contact with the head of the plunger. Forward movement of the center forces the plunger inward, compressing the spring. This action forces the split bushing onto the tapered end of the body, expanding the bushing and gripping the work tightly. On completion of the work, the center is withdrawn and the spring forces the plunger outward, carrying the split bushing with it and releasing the grip on the work, which can be removed without stopping the lathe. Outward movement of the bushing continues until it is stopped by the blind end of keyway *M* contacting stop *I*, which is attached to the outer end of the body.

By having several sizes of split bushings available, the range of the mandrel can be extended.



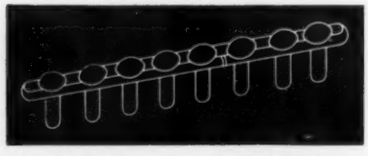
Contact of the tailstock center with the plunger expands the split bushing to hold the work securely

Link Holds Rivets for Heating

H. L. WHEELER

In a small shop that handles a lot of riveting jobs it was the practice to heat the rivets in an ordinary forge, a handful of rivets being put in the fire at a time. The smaller sizes had a habit of dropping down out of sight in the fire, making them hard to find. To overcome this anoyance, a link of ⅜-in. round iron and long enough to hold six or eight rivets was made, as shown in the sketch. The rivets are dropped through the opening in the link and rest on their heads.

The link is loaded with rivets and is placed in the center of the fire where it is always in sight. If many rivets are required on one job, two links can be used to keep up a continuous supply of hot rivets.



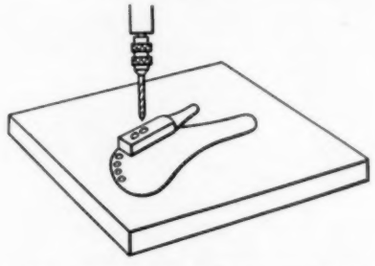
Loaded with rivets, the link prevents them from dropping down out of sight in the fire where they are hard to find when needed

Drilling Gage

J. DAVIES

Oshawa, Ontario, Canada

Ordinarily, drilling an irregularly shaped blanking die requires a separate layout for drill centers. This layout, except for the first hole, can be eliminated by using a spacing gage that is easily made from tool steel.



After drilling one hole it is possible to drill the succeeding holes around an outline without a layout

Two ⅛-in. diameter holes are drilled through a piece of ¼-in. square tool steel. These holes are positioned so that they just touch each other and both touch one side of the block. The tool steel block should be 2 in. or more long so that a handle can be turned on one end. After hardening, a piece of ⅛-in. drill rod, ½ in. long and turned for half the length to — 0.002 in., is driven in the hole nearest the end of the block so that the turned end projects ¼-in. from the block.

After marking off the blanking die to the required shape, one ⅛-in. hole is drilled close to the line. The pin of the big block is then inserted in this hole and the edge of the block is placed on the edge of the layout line. The second and each succeeding hole is thus located by the jig. If the drill has a tendency to run, a slight pressure on the lever will hold it central.

Castings for light duty sheaves are produced in jolt rammer molders

Sheaves for V-Belts

Close tolerances in machining contribute to the success of the V-belt drive

BURNHAM FINNEY
Western Editor

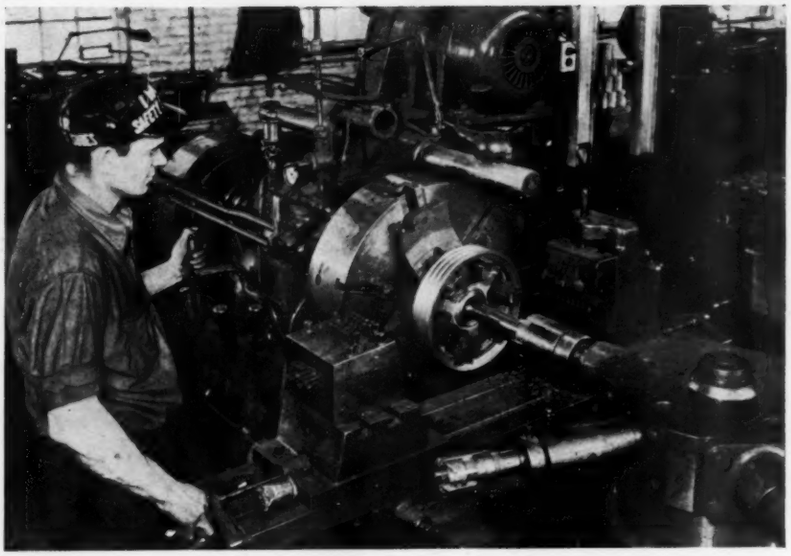
MERITS of the multiple V-belt drive have brought it increasing popularity the past decade, and today its operating characteristics are well known. This drive consists essentially of two distinct units, namely, the sheaves and the belts. Each is the product of specialists, and each contributes its share to the success or failure of the drive. The use of poorly designed or poorly finished sheaves may and generally will prove disastrous even when employed with the finest belts.

Some of the problems involved in production of properly designed and properly finished sheaves and their solution is exemplified by the practice of the Dodge Manufacturing Corporation. The greatest requirement of a multi-belt drive is teamwork. One belt pulling against instead of with the others becomes a burden, producing belt stress and causing slippage. The result is low efficiency and short belt life. Since any increase in machinery accuracy is usually accompanied by increased cost, to attain one without the other calls upon the use of extraordinary methods by the manufacturer.

Cast iron has been chosen as the material for its sheaves by the Dodge company. It is of ample strength and durability, offers the designer considerable freedom in producing an article of economical and pleasing proportions, is low in cost and is adaptable to fast and accurate machine operations. It also permits the introduction of special features as needed, such as flywheel effects, special location or design of hubs, and split construction.

In the smaller sizes Dodge has a light duty line of cast iron sheaves with interchangeable bushings. When Dodge speaks of its cast iron sheaves, it refers to a special formula iron

Arms and hubs are cored while a sweep forms the rim of a 72-in. pitch diameter by 14 in. sheave



Arm-type sheaves may be chucked under the rim to bore, ream, turn and groove in a single set-up

containing a high percentage of steel. This is employed to meet the necessity for a close-grained metal capable of producing a smooth finished surface free from sponginess, thus insuring groove surfaces which will not chafe the belts.

Dodge makes a complete line of sheaves. For relatively small drives is the light duty line limited to a maximum size of 18.4 in. pitch diameter for six *B* belts. This line has two features: a dual size grooving and an interchangeable bushing system. The groove has a special depth which allows use of either *A* or *B* belts. The *A* belts, being smaller, ride deeper in the groove than the *B* belts, the difference in pitch diameter being 0.4 in.

Die-Cast Bushings

Aside from dual grooving, economy is secured by use of the bushing system. Light duty sheaves under 7 in., for example, can be installed on shafts $\frac{1}{2}$ in. to $1\frac{5}{8}$ in. by changing bushings. Bushings are die cast with keys to fit the sheave bores cast integral. A flange on one end is fitted with a set screw and is drilled and furnished with a hollow head cap screw to be secured to the sheave. These sheaves are made in a range from 3 in. to 18 in. in diameter and are grooved for from one to six belts. Size 7 in. and under are solid or block type; larger sizes have arms.

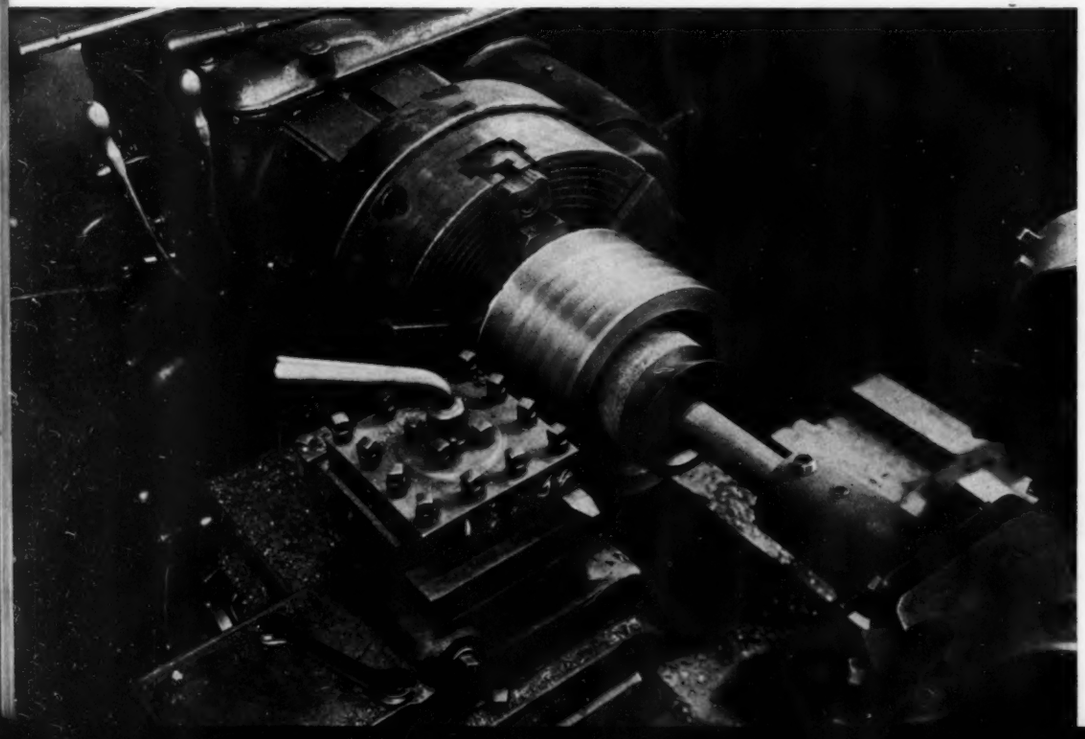
Following the light duty are the regular *A*, *B*, *C*, *D* and *E* sheaves (the letters referring to the belt sizes). Standard sizes of *A* sheaves are from 4 in. to 40 in. in diameter, with from one to twelve grooves. These sizes, as well as those made to special specifications, are manufactured on order only, as the light duty line covers most of the *A* belt requirements.

Sheaves in the *B* to *E* sizes range from 5.4 in. pitch diameter, with a single groove, up to 96 in. pitch diameter, with fourteen grooves. *D* and *E* sheaves are built to order only. Upper limits on diameter and number of grooves have no significance in the case of "made to order" sheaves except that they are the limits of the standard price lists and cover the sizes required for all ordinary drives. Actually, Dodge makes sheaves of any number of grooves and any diameter up to 14 ft.

For manufacturing purposes the entire sheave line may be divided into block type and arm type. Web center sheaves are included with the block type. Extremely wide faced sheaves may have double webs or double arms or even triple arms. Light duty sheaves are block type up to 7 in. in diameter and arm type above that.

Light duty sheave castings are made in the Dodge foundry from permanent patterns. The block-type are molded on jolt squeezer molding machines and on square flask jolt stripper machines. From two to six are made in a flask. Arm-type sizes are built in pulley flasks on jolt strippers.

Regular sheaves are molded similarly. The arm-type up to 54 in. in diameter use regular pulley arm patterns on stripper molding machines with special rim pattern equipment. Double-web and double-arm sheaves and sheaves larger than 54 in. in diameter are floor molded, standard-pulley center and arm cores being em-



The smaller block-type sheaves are also grooved in a turret lathe with the casting supported by a bull center after it has been bored

Sheaves with wide faces and comparatively small diameters are turned and grooved on lathes or vertical mills

ployed. Block center cores are utilized on the small diameters. The larger diameters use arm cores and the rim is made with a sweep.

From the foundry, sheave castings go to the cleaning room for rattling, sand blasting, chipping and grinding. They then are given a final inspection, weighed, tagged and sent to the machine shops. Light duty sheaves move to a separate and special group of machines, consisting of broaches, gang drills, engine lathes, automatic and multi-tooled lathes, automatic turret lathes and testing equipment. Block types are successively broached, keyseated, faced, turned under the flanges and on the outside of the hubs, and the edge filed.

Because of multiple tooling, several of these operations are checked for accuracy as the work progresses. After completion of machining, the work is checked closely for run-out, bore and groove dimensions and finish. Each sheave is stamped with the size number, painted and delivered to the warehouse.

Light duty arm-type sheaves pass through much the same operation as the block-type. However, since they may be chucked under the rims, they are adapted to multiple tooling to a great extent and all of the machining is done with only four set-ups. These sheaves, having arms, cannot be machined all over and require a balancing operation. Inspection, marking and painting are the same as for the block type.

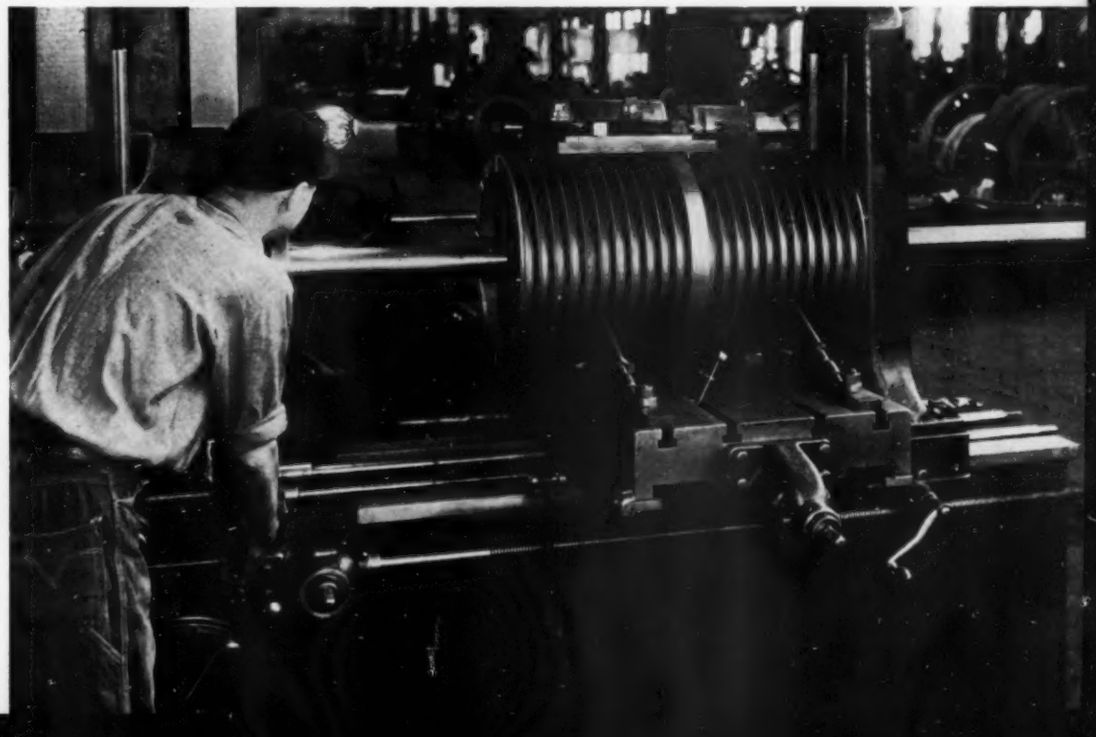
Bushings for light duty sheaves are die cast, are sized to close limits and require no machining on the outside. They must, however, be bored, keyseated and drilled and tapped for set screws. These operations are performed on specially equipped lathes, broaches and two-spindle drill presses. In the warehouse sheaves and bushings are packed in heavy cartons and labeled. Bushings are packed complete with set screws, cap screws and wrenches. Screws are of the hollow-head type; the same wrench fits both screws.

Standard and special sheaves for *A*, *B* and *C* belts up to 10 in. in diameter are rough bored, rough turned and faced, counterbored, rough and finish grooved, finish turned, and bored and reamed at one setting. Further operations face the rims and turn the outside of the hubs. Sheaves are then balanced, keyseated, drilled and tapped, this work being accomplished by special tooling on turret lathes, broaches and drill presses. The usual final inspection, marking and painting complete the work.

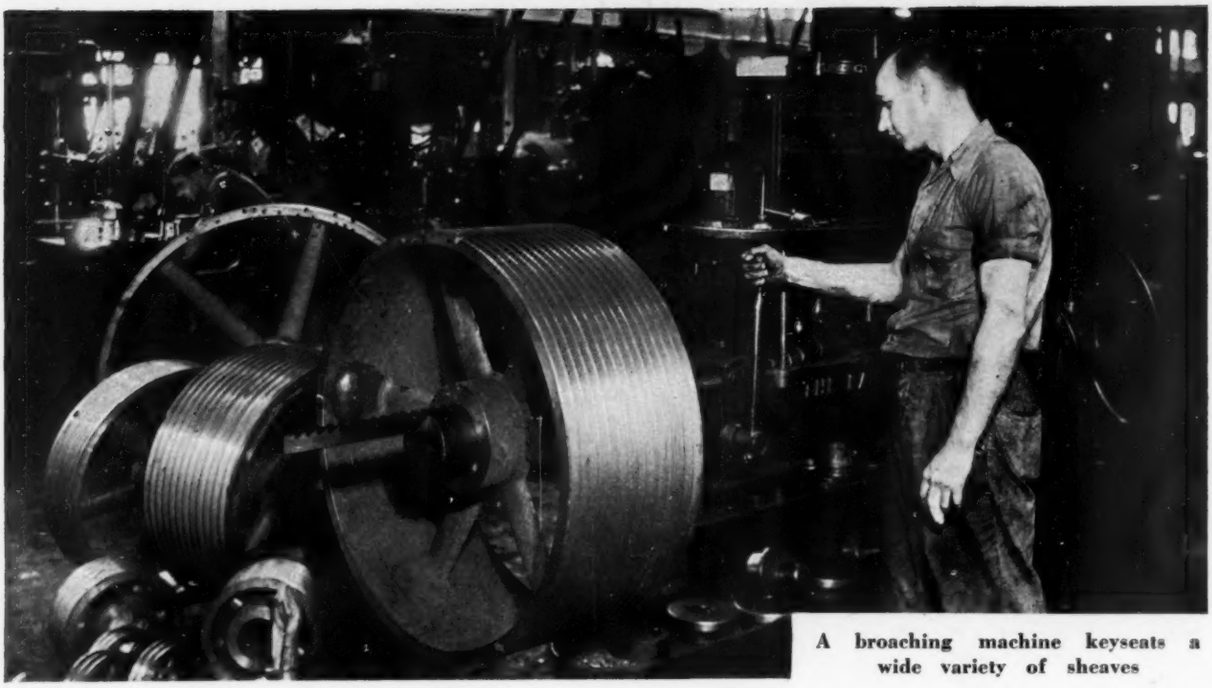
Special Boring Set-Ups

Similar operations are applied to sizes larger than 10 in., including the *D* and *E* sheaves, but for the most part, the turning, boring and facing operations are done on specially-tooled vertical boring mills. Exceptionally wide faces in the smaller diameters are usually turned on engine lathes and bored on horizontal boring mills. The large diameters (over 66 in.) are turned in large pulley lathes or on a 14-ft. vertical boring mill.

Cast iron interchangeable bushings for *B* and *C* sheaves are put through eight different operations consisting of boring, reaming, facing the ends, chamfering, grinding the outside diameter, keyseating the outside, drill-



A 31-in. face sheave is bored in a horizontal mill after the narrow spaced grooves have been finished



A broaching machine keyseats a wide variety of sheaves

ing and tapping, and stamping and burring. Bores are not keyseated until bushings are applied on order. This is because it is frequently necessary to rebore to some special specification. Such reboring and keyseating of the bore is done in the special sheave service department located in the warehouse.

The sheave service department assembles bushings in sheaves so that sheaves are shipped as complete units ready for installation on the shaft. The department is equipped with boring mill, keyseater and large arbor press which enable these last-minute operations to be done quickly. Light-duty sheaves, when ordered complete with bushings, are also assembled.

To be balanced sheaves are mounted on arbors and supported on anti-friction rollers which offer little resistance to rotation. Trial weights are applied until equilibrium in any position is attained. Permanent iron weights are then secured to the inner side of the rim by machine screws tapped into the rim. This method results in practically perfect static balance and prevents excessive vibration at all ordinary speeds. Sheaves under 30 in. outside diameter and weighing not over 500 lb. may be dynamically balanced when required. This is recommended when size permits, for speeds over 5,000 ft. per min.

After machining, sheaves are painted in a spray booth

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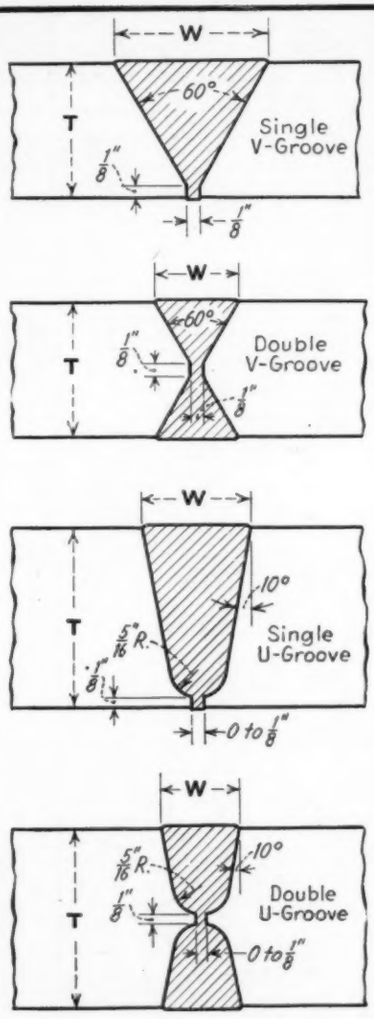
Metal Deposited in Welding

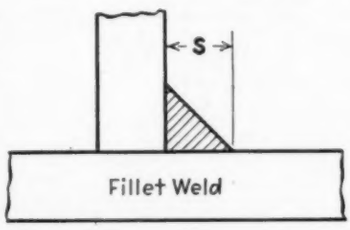
These data indicate the amount of weld metal required to make a weld, and are useful in calculating the cost of material. The figures under metal deposit are theoretical, not actual deposited weld metal. To them must be added the actual percentage above theoretical.*



BUTT WELDS

Plate Thickness T in In.	Single V-Groove: Weld Width W in In.	Area Sq. In.	Metal Deposit Lb. per Ft.	Double V-Groove: Weld Width W in In.	Area Sq. In.	Metal Deposit Lb. per Ft.
3/8	7/16	0.086	0.292			
1/2	9/16	0.145	0.493	11/32	0.104	0.354
5/8	11/16	0.219	0.745	7/16	0.157	0.534
3/4	7/8	0.328	1.115	1/2	0.211	0.718
7/8	1	0.438	1.490	9/16	0.274	0.932
1	1 1/8	0.563	1.915	5/8	0.344	1.170
1 1/8	1 5/16	0.734	2.495			
1 1/4	1 7/16	0.896	3.050	25/32	0.527	1.792
1 1/2	1 3/4	1.306	4.430	15/16	0.747	2.540
1 3/4	2	1.742	5.920	1 1/16	0.982	3.340
2	2 5/16	2.300	7.825	1 7/32	1.277	4.340
	*Also add 0.055 sq. in. to area and 0.19 lb. to metal deposit when under side of weld is chipped			*Also add 0.07 sq. in. to area and 0.24 lb. to metal deposit when under side of weld is chipped		

Plate Thickness T in In.	Single U-Groove: Weld Width W in In.	Area Sq. In.	Metal Deposit Lb. per Ft.	Double U-Groove: Weld Width W in In.	Area Sq. In.	Metal Deposit Lb. per Ft.
1	7/8	0.60	2.04	11/16	0.50	1.70
1 1/4	15/16	0.83	2.82	3/4	0.68	2.31
1 1/2	1 1/32	1.08	3.67	25/32	0.88	2.99
1 3/4	1 1/8	1.34	4.55	27/32	1.08	3.67
2	1 7/32	1.64	5.57	7/8	1.30	4.42
2 1/4	1 5/16	1.96	6.66	15/16	1.50	5.10
2 1/2	1 3/8	2.29	7.78	31/32	1.75	5.95
2 3/4	1 15/32	2.65	9.02	1	1.99	6.77
3	1 9/16	3.02	10.21	1 1/16	2.28	7.76
3 1/4	1 21/32	3.33	11.32	1 3/32	2.53	8.60
3 1/2	1 3/4	3.86	13.12	1 5/32	2.83	9.62
3 3/4	1 13/16	4.30	14.62	1 3/16	3.11	10.58
4	1 15/16	4.76	16.20	1 1/4	3.43	11.67
	*Also add 0.055 sq. in. to area and 0.19 lb. to metal deposit when under side of weld is chipped			*Also add 0.07 sq. in. to area and 0.24 lb. to metal deposit when under side of weld is chipped		



FILLET WELDS

Size Fillet S in In.	Area Sq. In.	Metal Deposit Lb. per Ft.	Size Fillet S in In.	Area Sq. In.	Metal Deposit Lb. per Ft.
3/16	0.018	0.061	9/16	0.158	0.537
1/4	0.031	0.106	5/8	0.195	0.663
5/16	0.049	0.167	3/4	0.281	0.956
3/8	0.070	0.238	7/8	0.383	1.303
7/16	0.096	0.326	1	0.500	1.700
1/2	0.125	0.425			

Metal Deposited in Welding

These data indicate the amount of weld metal required to make a weld, and are useful in calculating the cost of material. The figures under metal deposit are theoretical, not actual deposited weld metal. To them must be added the actual percentage above theoretical.*

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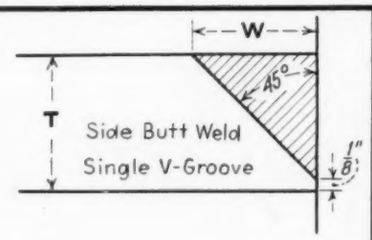
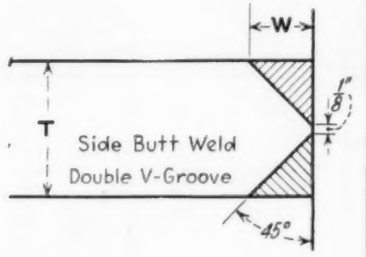
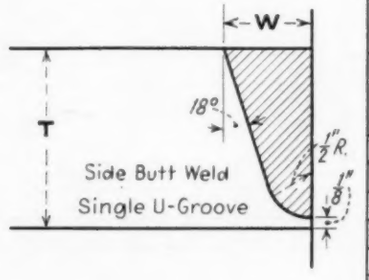
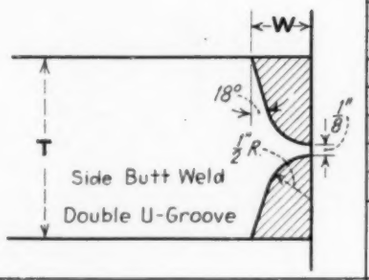




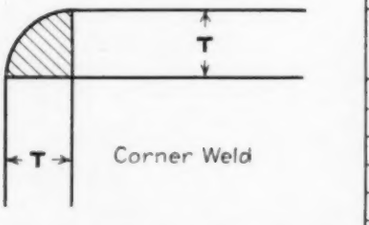




SIDE BUTT WELDS

Plate Thickness T in In.	Single V-Groove: Weld Width W in In.	Single V-Groove: Area Sq.In.	Single V-Groove: Metal Deposit Lb. per Ft.	Double V-Groove: Weld Width W in In.	Double V-Groove: Area Sq.In.	Double V-Groove: Metal Deposit Lb. per Ft.
3/8	1/4	0.031	0.106			
7/16	5/16	0.049	0.167			
1/2	3/8	0.070	0.238	3/16	0.035	0.120
9/16	7/16	0.096	0.326			
5/8	1/2	0.125	0.425	1/4	0.063	0.213
3/4	5/8	0.195	0.663	5/16	0.098	0.332
7/8	3/4	0.281	0.956	3/8	0.141	0.478
1	7/8	0.383	1.303	7/16	0.191	0.651
1 1/8	1	0.500	1.700	1/2	0.250	0.850
1 1/4	1 1/8	0.633	2.152	9/16	0.316	1.076
1 1/2	1 3/8	0.945	3.215	11/16	0.473	1.607
1 3/4	1 5/8	1.320	4.480	13/16	0.660	2.245
2	1 7/8	1.758	5.980	15/16	0.879	2.988
	*Also add 0.055 sq.in. to area and 0.19 lb. to metal deposit when under side of weld is chipped			*Also add 0.07 sq.in. to area and 0.24 lb. to metal deposit when under side of weld is chipped		

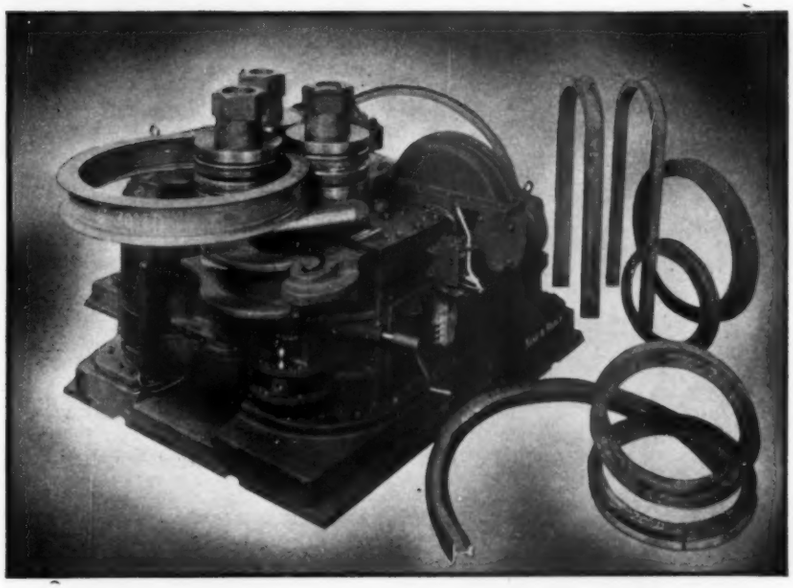
Plate Thickness T in In.	Single U-Groove: Weld Width W in In.	Single U-Groove: Area Sq.In.	Single U-Groove: Metal Deposit Lb. per Ft.	Double U-Groove: Weld Width W in In.	Double U-Groove: Area Sq.In.	Double U-Groove: Metal Deposit Lb. per Ft.
1	5/8	0.42	1.43	1/2	0.31	1.05
1 1/4	23/32	0.60	2.04	9/16	0.41	1.39
1 1/2	25/32	0.79	2.69	19/32	0.58	1.97
1 3/4	7/8	1.01	3.43	5/8	0.72	2.45
2	31/32	1.22	4.15	21/32	0.90	3.06
2 1/4	1 1/32	1.48	5.03	11/16	1.08	3.67
2 1/2	1 3/32	1.74	5.92	3/4	1.26	4.28
2 3/4	1 3/16	2.03	6.90	25/32	1.46	4.96
3	1 9/32	2.34	7.95	13/16	1.66	5.65
3 1/4	1 11/32	2.67	9.08	7/8	1.84	6.26
3 1/2	1 7/16	3.03	10.30	29/32	2.09	7.12
3 3/4	1 1/2	3.38	11.50	15/16	2.31	7.86
4	1 19/32	3.79	12.90	31/32	2.58	8.78
	*Also add 0.055 sq.in. to area and 0.19 lb. to metal deposit when under side of weld is chipped			*Also add 0.07 sq.in. to area and 0.24 lb. to metal deposit when under side of weld is chipped		



CORNER WELDS

Plate Thickness T in In.	Area Sq.In.	Metal Deposit Lb. per Ft.	Plate Thickness T in In.	Area Sq.In.	Metal Deposit Lb. per Ft.
1/8	0.012	0.042	1/2	0.196	0.667
3/16	0.028	0.094	9/16	0.249	0.845
1/4	0.049	0.167	5/8	0.307	1.043
5/16	0.077	0.261	3/4	0.442	1.502
3/8	0.111	0.375	7/8	0.601	2.044
7/16	0.150	0.511	1	0.785	2.670

Shop Equipment News



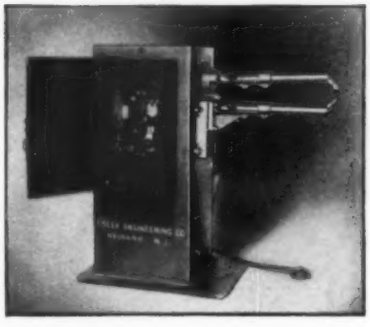
Light sections can be bent at 50 to 75 ft. per min. with the Kane & Roach No. 23 horizontal angle-bending roll

Kane & Roach No. 23 Horizontal Angle-Bending Roll

In addition to being suitable for bending angles, the No. 23 horizontal angle-bending roll offered by Kane & Roach, Inc., Syracuse, N. Y., is suitable for bending I-beams, rails, channels, flats, squares, T's, Z-bars, pipe and special shapes. The front roll can be adjusted in and out for variation of the diameter of the circle. This is usually accomplished by manual operation of the adjusting screw, but the machine can be furnished with power drive for this adjustment. A quick release is provided on the latch lock and the pressure-adjustable roll shaft can be quickly swung to remove bent sections from the roll passes. Capacity is 5x5x½ in. angles, leg out, and 4½x4½x½ in. angles, leg in.

Design is such as to provide an edge bearing on the vertical leg of the angle when bending angles leg in, thereby relieving the strain on the horizontal leg. Edge bearing taper plates are designed so that the legs of the angle remain square and the horizontal leg remains parallel to a straight edge laid across the face of the circle. Plates of this type are required only when bending angles, leg in, to small diameters.

Production speed is approximately 18 to 27 ft. per min. Light sections, however, can be operated up to 50 to 75 ft. per min., if required. Main drive motor is 30 hp.; a separate 15 hp. motor is provided for the power adjusting screw. Both motors are directly connected to reduction gear boxes of the inclosed type with all gears running in oil.

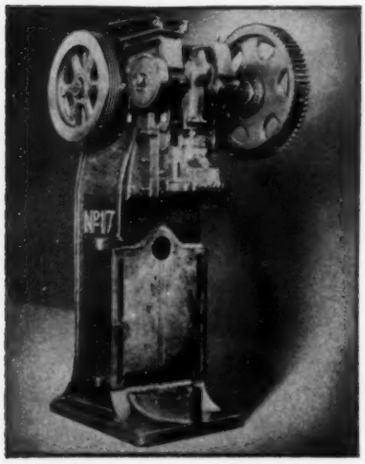


Eisler Air-Operated Spot Welder

Interchangeable arms, available for use with the spot welder announced by Eisler Engineering Co., 770 South 13th St., Newark, N. J., permit a wide variation in type of work performed. Lower arm can also be raised or lowered to conform to the depth of work required. A water-cooling arrangement passes water through the arm, electrode holders and electrodes. This welder is claimed to be capable

of making up to 100 spot welds per min. It is equipped with an 8-point hand wheel for heat regulation and has an air-cooled transformer.

Welds are controlled by means of a solenoid starter which, when depressed, actuates the air cylinder that closes the electrodes on the work. Duration of the welding period is regulated by an automatic timer and contactor, mounted on the side of the frame. This timer is adjustable to regulate current from 2 to 60 cycles in 110 divisions. An air pressure valve permits regulation of welding pressure. An air pressure of 35 to 60 lb. is required to operate the machine.

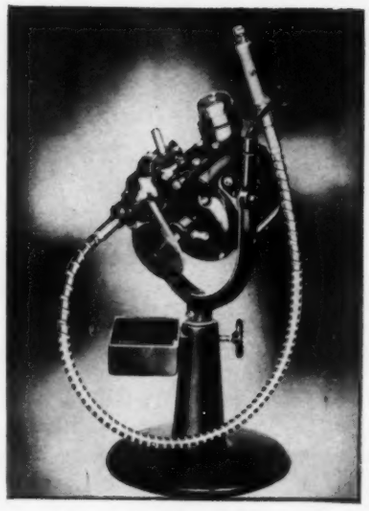


Niagara No. 17 Horn Press

Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y., has added the No. 17 horn press which has a 4-in. shaft mounted in bearings split at an angle of 45 deg. Thus, thrust is transmitted directly to the frame. Inclined in the design are a cast-steel frame, a fourteen-point-engagement, sleeve clutch with a built-in single-stroke mechanism, double V-gibs, a rigid slide with breech-block die clamp, and a self-contained back gear assembly mounted within the frame for accurate alignment.

Strand Type MY-4 Tool Grinder

Type MY-4 flexible-shaft grinder, offered by N. A. Strand & Co., 5001 No. Wolcott Ave., Chicago, Ill., is driven by a ¼-hp. motor with an integrally mounted 3-speed ball-bearing countershaft. The motor is mounted in a swiveling yoke, permitting the

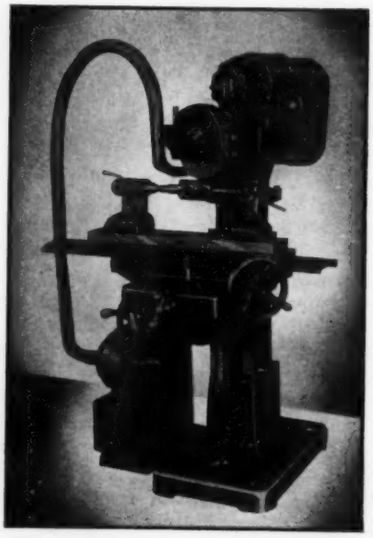


machine to be used in all positions. A 4-ft. flexible shaft with a ball-bearing handpiece fitted with a split collet is furnished. Two combinations of speeds are available. The low range has speeds of 1,700, 3,000 and 5,200 r.p.m. while the high speed range is 3,400, 6,000 and 10,400 r.p.m. Either speed combination can be furnished.

A small, ball-bearing, right-angle attachment has been developed for use with this grinder. This attachment is arranged with a split collet for holding tools having round shanks.

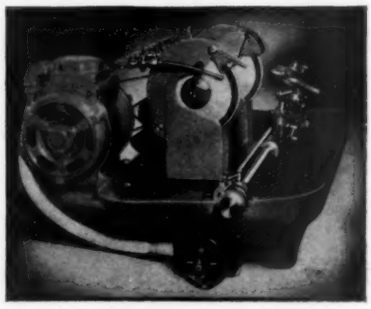
Covel No. 72-A Surface Grinder

Equipped with both a swivel head and a swivel table, the No. 72-A swivel-head surface grinder offered by Covel Mfg. Co., Benton Harbor, Mich., is suitable for grinding all types of milling cutters, counterbores, special tools and irregular surfaces.



Centers or fixtures can be mounted on the swivel table, which is graduated on one end in degrees and on the other end in inches per foot. Lip rests are provided for indexing cutters. The grinding wheel is driven by a 1½-hp. motor through a V-belt. The head swivels 30 deg. in each direction and the motor is mounted on a vibration-absorbing base which swivels with the head. Longitudinal travel of the table is through a spiral gear and rack on the table.

Specifications: Longitudinal travel of table, 18 in.; vertical travel of table, 11 in.; traverse movement of table, 7½ in.; working surface of table, 6x28¾ in. Table swivels 45 deg. each way and centers will swing work 12⅛ in. diam. by 14½ in. long. Maximum distance from center of grinding wheel to the table is 17½ in., minimum distance is 6½ in. Main spindle speeds are 1,900, 2,400 and 2,900 r.p.m. Standard grinding wheel is 10 in. diam. by ¾ in. thick by 2½ in. hole.



"Agathon" Tool Grinder

"Agathon" grinding and lapping machines, of Swiss manufacture, are marketed in this country by Russell, Holbrook & Henderson, Inc., 99 Hudson St., New York, N. Y. These grinders are designed particularly for cemented-carbide tools. Frame is of sturdy construction and is intended for mounting on a bench or a suitable pedestal. Spindle is of Nitralloy and is carried in phosphur-bronze bearings. Any type of grinding wheel may be used, but diamond wheels are recommended. These are furnished in two grades, one for rough and the other for finish grinding or lapping. Standard wheels furnished have two working surfaces, one on each side. Each has a rim width of 0.40-in. on a 6-in. diameter and a diamond depth on each side of 0.160-in. for the roughing and 0.080-in. for the finishing wheel.

Compound angle tool-rest can be adjusted angularly in all directions

and clear reading scales are provided. Grinding is done by rocking on the tool-rest bar. Work can be transferred from the roughing to the finishing wheel without disturbing the setting.

Standard tool-rest supplied with the machine will take a tool shank up to ½-in. square. A larger tool-rest having capacity up to 1⅝-in. square can be furnished. A flat, inclinable table which is interchangeable with the tool-rest is provided for handling radius and similar tools. Drive is from a standard ½ hp., 1,725 r.p.m. motor. Belt tension is adjustable.

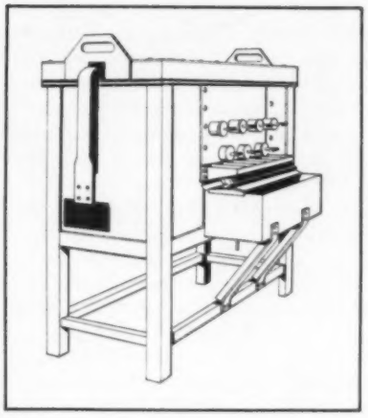
"Doall Metalmaster" Contour Saw

Continental Machine Specialties, Inc., 1301 Washington Ave., South, Minneapolis, Minn., have announced the "Metalmaster" contour saw, which is available in two sizes. One model, having a 14-in. throat, will accommodate most tool and production work. The 30-in. throat machine is provided for operations that require larger capacities.

A weight-actuated power feed permits cutting speeds suitable for the material being worked. Feed force can be adjusted from 0 to 50 lb. and the angle of force may be varied without diminishing the total force exerted. A speed change ratio of 16 to 1 is available for the saw drive, giving a saw feed range from 50 to 800 ft. per min. A "job selector dial" provides exact data on saw speeds and specifications for 48 materials. A tachometer with speedometer-type dial indicates to the operator the exact speed at which the machine is operating.

Bellis Electric Heat-Treating Furnace

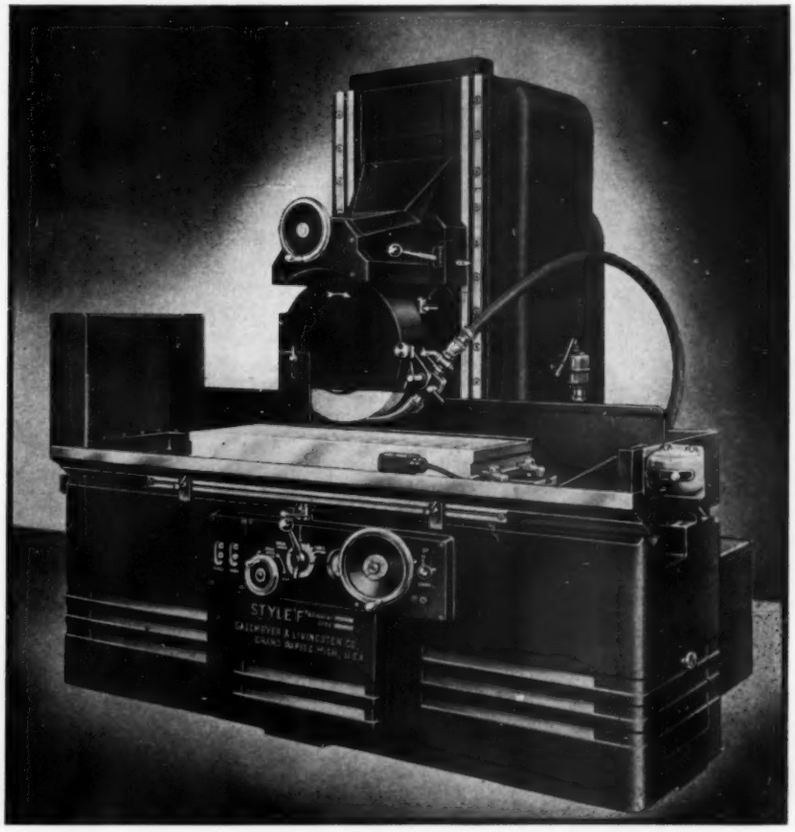
Heated internally by the resistance of a salt bath to low voltage electric current passed between electrodes, these furnaces have been developed by The Belis Heat Treating Co., Branford, Conn., for heat-treating aluminum parts. A substantial metal resistor coil connected between the electrodes is designed to increase in resistance with temperature, making it possible to draw an almost constant value of current throughout the wide temperature range of 300 to 1,200 F. This eliminates the use of variable-voltage equipment and simplifies the construction of the furnace. This resistor makes the furnace self-starting when the salt bath is in the cold, solid condition. These furnaces are designed primarily for heating aluminum alloy in the form of sheets and rivets to 700-900 F.



Gallmeyer & Livingston Style F Hydraulic-Feed Surface Grinder

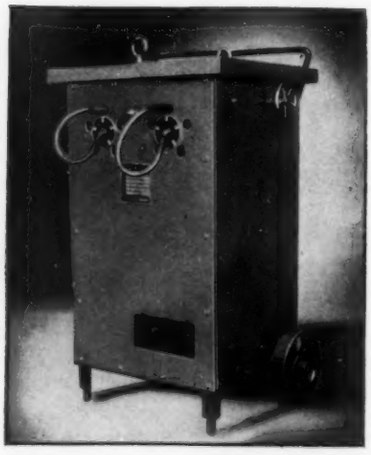
All operating controls of the Style F high-speed cross-traveling head type hydraulic feed surface grinders, offered by Gallmeyer & Livingston Co., 346 Straight Ave., S. W., Grand Rapids, Mich., are in the center of the base and easily accessible. Pushbutton switches control the spindle motor and the hydraulic pump, as well as the coolant pump motor and the vertical power traverse of the wheelhead.

Table speed has an infinite variation from 0 to 150 ft. per min., when the machine is driven by a 60-



cycle motor. Starting and stopping of the table and control of table speed is by means of a single lever. Spindle cross slide has a movement equal to the working surface of either the 16 in. or 18 in. wide table. Thus a 4-in. standard width wheel overruns the working surface 2 in. on both the front and back edge of the table. Cross traveling movement normally operates at each reversal of the table and amount of movement can be set between $\frac{1}{2}$ to 2 in. Total amount of cross travel in a given direction is governed by adjustably positioned dogs. Automatic reverse is provided for cross travel of the wheel. Standard spindle drive is by means of a 25-hp. motor directly connected to the spindle through a spline.

Hand vertical movement of the wheel head is controlled by a handwheel in front of the base. Dial on this handwheel is graduated in 0.0001 in. Wet grinding equipment is standard. Automatic force feed lubrication of the table ways is provided from the hydraulic pressure line.

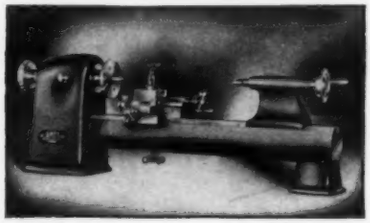


Wilson 150-Amp. Arc Welder

Wilson Welder & Metals Co., Inc., 60 East 42nd St., New York, N. Y., has anounced a 150-amp capacity a.c. transformer-type arc welder to complete a line of welders that now includes machines ranging from 150 to 1,000 amp. capacity. This unit is self-contained, requiring only the welding cable,. electrode holder, and hand-shield. A system of three controls permit adjustments of the welding current. It is possible to obtain 25 coarse adjustments through the first two controls. The third control permits a finer adjustment of current values within any one of the 25 coarse adjustments.

Ames No. EH3 Bench Lathe

B. C. Ames Co., Waltham, Mass., has announced the No. EH3 inclosed-head precision bench lathe which has a ball-bearing spindle and is equipped with Transitorq drive. Spindle speeds ranging from 200 to 2,000 r.p.m. are



obtainable with the standard drive, which uses a ½-hp. a.c. or d.c. motor. Twin V-belts connect the lathe and Transitorq, and are tightened by lowering the drive unit. The entire headstock assembly can be taken apart easily and is equipped with preloaded precision ball bearings. The bed has a T-slot for attachments.

Specifications: Length of bed, 36 in.; maximum distance between centers, 17½ in.; swing over bed, 8⅜ in. in diameter; collet capacity, 1 in.; tailstock spindle travel, 3½ in.; compound rest top slide travel, 5½ in.; compound rest bottom slide travel, 3¾ in.; compound rest swivels 50 deg. either side of center. Net weight of lathe with regular equipment, 120 lb.

Gage Plating Service

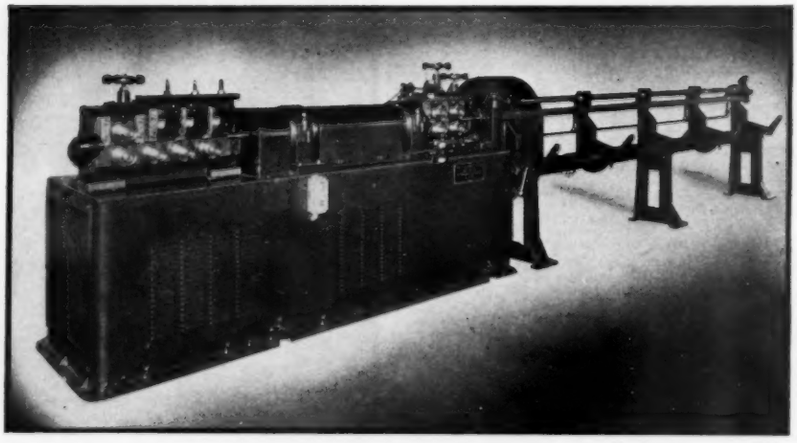
A specialized chromium plating service is offered to users of Johannson gage blocks by the Dearborn Gage Co., Dearborn, Mich. This concern specializes in the application of wear- and rust-resistant chromium plate to the surfaces of Johannson gage blocks. Advantages claimed are preservation of close accuracy for a much longer period of time and elimination of rust corrosion.

Finishing operations are under the guidance and direction of Elmer Ellstrom, son of Hjalmar Ellstrom who was associated with C. E. Johannson on the original development of gage block measurements. The chromium plating plant was designed by the United Chromium Company and equipment was supplied by the Udylite Co., Detroit, Mich.

Shuster No. 4A "Dual Control" Wire Straightener and Cutter

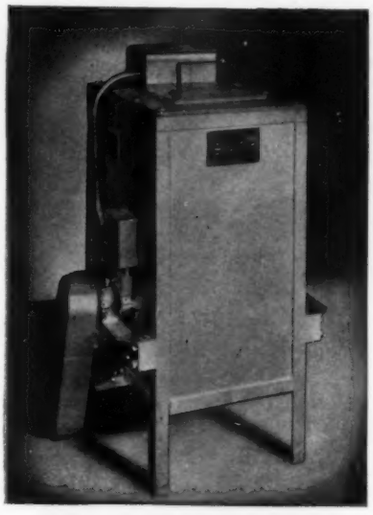
The No. 4A "Dual Control" automatic wire straightening and cutting machine offered by The F. B. Shuster Co., New Haven, Conn., feeds wire from the coil, straightens it and cuts it to accurate lengths. This machine is of unit construction, the preliminary straightening roll housing, the feed roll unit, the rotary flier, and the cut-off mechanism, as well as the variable-speed drive units being mounted on a welded-steel base. Variable-speed units may be eliminated and the machine can be furnished as a constant-speed unit.

Extension support brackets, mounted on a steel pipe, are constructed to hold the cut lengths of wire away from the machine, so that they can be readily removed with a crane. The guide bar is stationary, being fastened to the extension support. Guide bar cover and cut-off are operated by separate cams.



Lindberg "Cyclone" Laboratory Furnace

The laboratory-type "Cyclone" furnace, offered by Lindberg Engineering Co., 221 Union Park Court, Chicago, Ill., has a work chamber 8-in. in diameter by 10-in. deep. It is provided with a plug-type cover which is easily lifted for inserting the load.

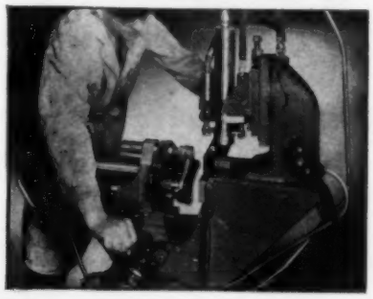


Electric heating elements are mounted in a separate chamber, thereby eliminating all direct radiation to the charge. A blower fan circulates the heated air through the work chamber, providing rapid and uniform heating.

Furnaces are constructed of heavy steel plates, reinforced with structural angles that extend to the floor and form a base to support the furnace at a convenient working height. Slab insulation keeps heat loss at a minimum throughout the temperature range up to 1,250 F. This furnace is claimed to be suitable for determining the response of various steels to specified heat-treatment as well as for tempering small tools and individual steel parts.

"Progressive" Punching Unit

Self-stripping, hydraulic punching units are offered by Progressive Welder Co., 737 Piquette Ave., Detroit, Mich., for production punching of sheet metal parts. Individual punching units eliminate expensive cam dies and can be positioned to accommodate curved or irregular parts. Each unit will punch one or a group of holes in one movement and will accommodate up to No. 11 gage sheet. The hydraulic stripper positions the work against the die before punching and releases it only after the punching cycle is completed. This stripper is claimed to prevent distortion of the material and to insure clean, accurate holes. Punching units can be mounted in groups in fixtures

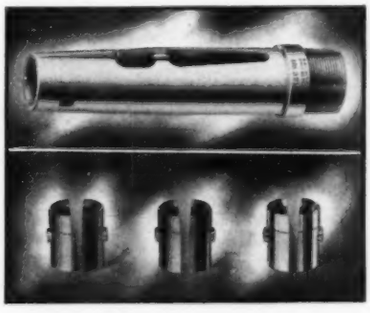


and are easily changed to accommodate variations or revisions.

Units are connected to a master control valve which, with a single movement, starts the punching operation. Clamping devices are used for holding large irregular parts. Hydraulic pressure is supplied by an electrically-driven hydraulic pump. The units are fitted to accommodate standard interchangeable punches and dies.

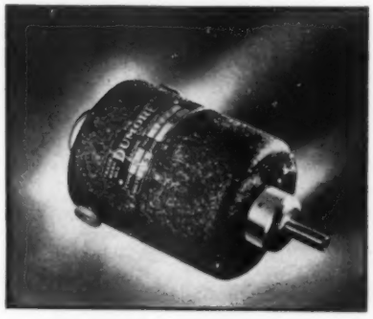
B.&S. Master Feeding Fingers

Round or hexagonal pads of hardened steel, bronze or cast iron are interchangeable in the master feeding fingers introduced by Brown & Sharpe Mfg. Co., Providence, R. I., for automatic and wire-feed screw machines. The entire finger is given a spring-temper treatment for tension to hold the pads and stock. Two pads take the wear from the finger and can be interchanged with pads of a different material, size or shape as the demands of the work require. Hardened steel pads give the maximum wear life and are suitable for most screw-machine jobs. Bronze pads are claimed to be somewhat superior for feeding polished stock and have less tendency to mar or injure the surface finish. Cast-iron pads offer a wear-life longer than that of bronze pads and are suitable for feeding polished stock where the requirements are not as severe as to demand bronze pads. A slot wrench makes changing of pads comparatively simple.



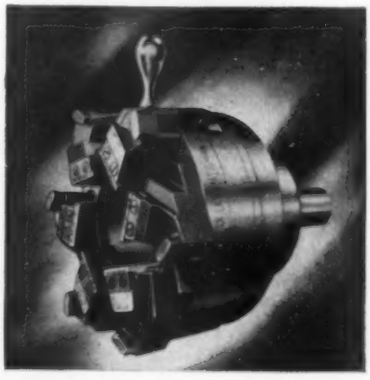
Dumore Type H Universal Motors

A 1/50-hp. universal motor, available in several different types, has been announced by the Dumore Co., Racine, Wis. The standard totally-inclosed motor, known as the Type H, is rated at 1/50 hp. at 6,500 r.p.m. for 30-min. duty. Type HV motor is of the standard open-type and is rated at 1/50 hp. at 5,000 r.p.m. continuous duty, or 1/55 hp. at 4,000 r.p.m. for 30-min. duty. These motors are available with sleeve or ball bearings and with worm-gear speed reduction units.



"Landmatic" No. 40-AX Self-Opening Diehead

Capacity of the "Landmatic" No. 40-AX Type H self-opening diehead, offered by Landis Machine Co., Inc., Waynesboro, Pa., is 4 to 5⅛ in. with

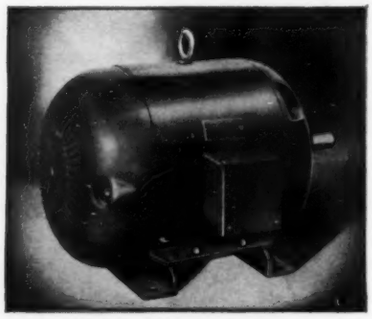


a pitch range of 7 to 20 threads per inch. Thread length, while not unlimited, is sufficient to take in a wide range of lengths. The head illustrated has a capacity of 7-in. thread length on 5⅛-in. diameter stock.

This head is of the pull-off type for application to turret lathes and to hand screw machines. It is heat-treated throughout and ground for maximum wearing qualities. Diametrical graduations on the circumferential surface and on the adjusting screw insure rapid and accurate size changes.

Wagner Type CP Inclosed Motors

Type CP totaly inclosed, fan-cooled motors, offered by Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo., are designed for driving equipment which must be operated in atmospheres heavily laden with abrasive dusts, deteriorating metals and



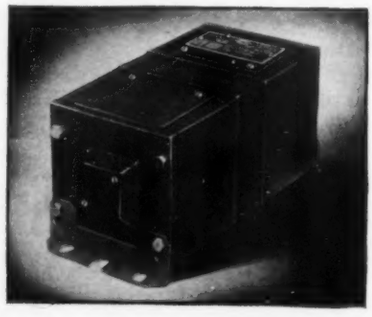
salts, explosive dusts, corrosive gases and extreme dampness. Motor has a skeleton-type stator, which is provided with totally inclosed ball-bearing endplates having long fits that completely seal the working parts. An external blower is mounted on the front end which directs cooling air around and over the corrugated surfaces on the stator.

National Acme "Chronologs"

The National Acme Co., 121 E. 131st St., Cleveland, Ohio, has announced two new models of "Chronolog" instruments for measuring and controlling machine down time. The Model M Chronolog shown in the accompanying illustration, may be applied to any machine, process or operation. When the operator starts work, he turns on the Chronolog and the time of starting is printed on a paper tape. Window at the upper right in the instrument shows clock time. A counter visible through the large window at the left registers the number of units produced. When there is an interruption at the machine, the operator turns the knob at the left to a symbol indicating the

reason for the interruption. This is then registered on the tape. When production is resumed, the operator pushes a button on the front of the instrument and the time is printed on the tape. Quantity produced and the time is printed on the tape every ten minutes. Visits by foremen, inspectors, shopmen or others to the machine can be recorded. At the end of the day the printed record shows how many minutes the machine was in operation, the number and extent of all interruptions and the reason for these interruptions.

Model O Chronolog is a simple device which contains only one set of digit wheels. These may be arranged to count idle time or units produced. It also carries a tape roll which automatically prints every ten minutes, or printing may be secured at any time by inserting a card.



Acme Lighting Transformer

Designed especially for use with high-intensity mercury-vapor lamps, the lighting transformers offered by Acme Electric & Mfg. Co., 1444 Hamilton Ave., Cleveland, Ohio, are suitable for either ceiling or wall mounting, or can be pendant mounted to hang directly above the light reflector. Removable mounting legs are provided. These transformers are available in an inclosed universal mounting type or in an open core and coil type for 50- or 60-cycle circuits. Sizes are available for different primary voltages and lamp sizes.

G. E. "Mushroom" Pushbutton Station

The pushbutton station with "mushroom" head for the stop position, offered by General Electric Co., Schenectady, N. Y., is of the same general construction as the standard heavy-duty pushbutton station. The

"mushroom" head is screwed to a metal insert in the end of the button. This station is claimed to be particularly suitable for use on machines where it is necessary for the operator to wear heavy gloves or asbestos mittens. It is a simple matter for the operator to slap the button when conditions require him to make a rapid shut-down of the machine.

"Electrocell" Photo-Electric Elements

"Electrocell" is the trade name of a line of self-generating, dry-disk, photo-electric cells distributed in the United States by Dr. F. Loewenberg, 10 East 40th St., New York, N. Y. These cells are available in a wide variety of sizes and shapes from ⅜ up to 2⅝ in. diameter, rectangular sizes ranging up to 1½ x 2 in. They can be directly connected to a magnetic relay of sufficient sensitivity, no amplification or additional electrical energy being required. Maximum voltage created by these elements is 0.6 volts and maximum current output is 480 microamperes per lumen.

Hoffman "Flexbox" for Heat-Treating

The Hoffman "Flexbox" container for carburizing, annealing and other heat-treating processes has been introduced by the American Manganese Steel Co., Chicago Heights, Ill. "Flexbox" is made in six separate parts of heat- and abrasion-resistant "Amsco" alloy. Corrugated sides are

tongued to fit into grooves in the corrugated ends and may be keyed in place. The frame thus formed nests on a flanged bottom plate with legs for batch-type furnaces. A flanged cover fits over the box.

Sufficient clearance is provided between the tongue and groove to absorb expansion from heating of the parts and to allow contraction in cooling. The design, however, does not permit appreciable gas leakage at the joints. Should a section of the box fail, it can be quickly replaced.

W. L. Electronic Voltage Regulators

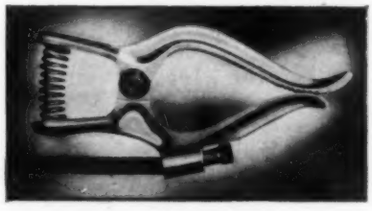
Two automatic electronic alternator voltage regulators are announced by Ward Leonard Electric Co., Mount Vernon, N. Y. There are no moving parts in these regulators and an inertialess stream of electrons controls and regulating action. Power is derived from the a.c. generator and d.c. current is delivered to the shunt field of the excitor in an amount which is a function of the a.c. generator potential. Corrective action of Type 5601 regulators starts within one-half cycle of a change in generator voltage; Type 5602 regulators start within one cycle.

Bridgeport Grinding Wheels

Recently completed additions to the plant of the Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn., permit production of vitrified-process, resinoid-process and silicate process grinding wheels. These wheels are offered in addition to the specialized wheels formerly manufactured by this company. Wheels of grain, grade and bond best suited for various types of work can be furnished.

"Redhead" Ground Clamp for Welding Cables

Having capacity up to 500 amp. and a jaw opening of 2½ in., the "Redhead" ground clamps offered by Tweco Products Co., 829 S. Madison, Wichita, Kan., are designed to make

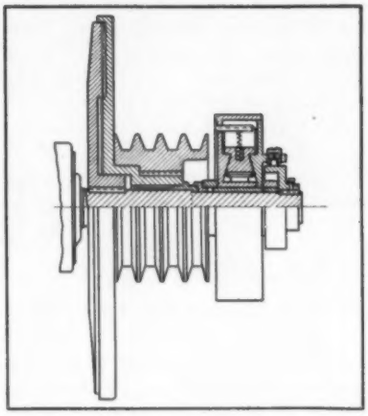


a quick, positive and portable connection for welding cables. It is claimed that cable heating is eliminated. Over-all length is 10 in. and weight is 3 lb.

A line of mechanical cable lugs has been introduced to provide a means of connecting cables without the need of soldering. A tapered screw terminal wedges into the hollow corrugated body, giving a positive connection. Field installation is quickly made. These lugs are available in both hole and open types for Nos. 00 to 4 stranded cable.

Dickson Adjustable Automatic Clutch

Consisting of three principal parts, the adjustable automatic clutch offered by Dickson Automatic Clutch Co., 606 South Hill St., Los Angeles, Calif., will operate equally well in either direction of rotation. A simple



adjustment regulates the time-lag which permits the motor to obtain full speed before load is applied. This clutch consists of a drive plate keyed to the drive shaft, a movable plate upon the hub of which is keyed a pulley, sheave or sprocket and, floating on the shaft, an actuating unit equipped with a time-lag adjusting mechanism containing centrifugal weights. These weights operate the movable clutch plate as the actuating unit comes up to speed.

It is claimed that this clutch does away with the necessity for high starting-torque motors and, in many cases, permits the substitution of squirrel-cage motors for more expensive slip-ring motors. The clutch is non-locking, releasing at once when the speed drops below the critical point. Sizes range from 1/20 to 350 hp., for speeds from 600 to 3,600 r.p.m. Time-lag interval is adjustable downward from the maximum, which may be as much as 10 min.

USL "Durapak" Industrial Battery

"USL Durapak" storage batteries, designed for use in industrial trucks, electric locomotives, and for railroad car lighting and air-conditioning service, anonunced by USL Battery Corp., Niagara Falls, N. Y., use "Permatex" all-rubber separators to balance the long service life claimed for the positive plates. Negative plates have tapered tops and insulated edges for protection against short circuits.

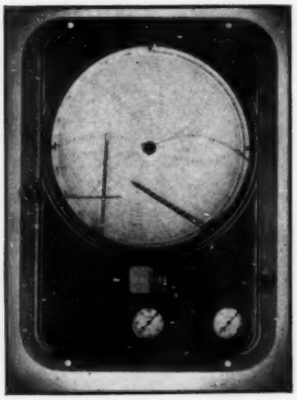
The positive plate is of sectional construction to withstand expansion and contraction stresses. It has a heavy, one-piece, interlocking-plate grid for increased strength and conductivity. Plates are machine-pasted for uniformity and glass-fiber retainer pads are used to prevent loss of plate material.

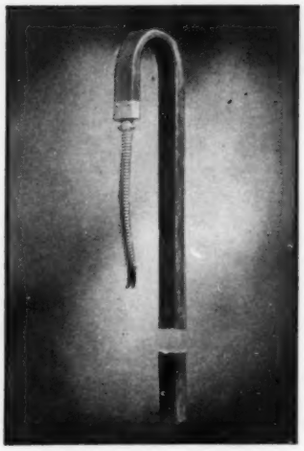
G.E. "Strip" Heater

A strip heater having offset terminals has been added to the line of small heating units manufactured by General Electric Co., Schenectady, N. Y. It is claimed that the offset-terminal construction facilitates wiring and arrangement of strip heaters in series. These units, which except for their terminals are similar in construction to standard strip heaters, are available in convenient lengths and ratings. A busbar having holes punched at frequent intervals to fit the offset terminals of the strip heater, is also available.

Bristol Round-Chart Pyrometer Controller

The "Pyromaster" round-chart potentiometer-type pyrometer controller, developed by The Bristol Co., South Main St., Waterbury, Conn., is available in both pneumatic and electric types. Standard thermocouples and extension leads are used and the instrument is suitable for direct ink-marking on 12-in. round charts, or for indicating on a large scale. These controllers require no lubrication and are not affected by plant vibration. Instruments are self-balancing and self-compensating for cold-end temperature changes. The pen arm or indicator is actuated in small steps that folow each other at a rate depending upon the rate of change in the temperature at the thermocouple, permitting response to changes as they occur.





Trent Plating-Tank Immersion Heater

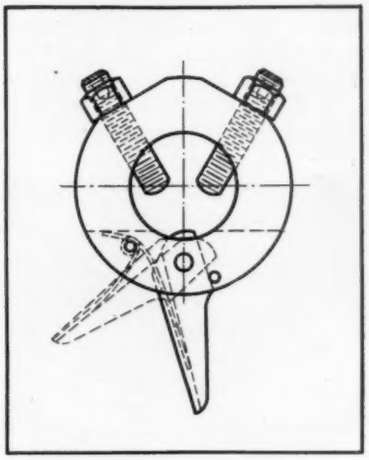
Electric immersion heaters for plating tanks, offered by Harold E. Trent Co., 618 North 54th St., Philadelphia, Pa., are provided with goosenecks for hanging over the side of the tank. Casings are made of copper, steel or other alloys and are lead coated when required for nickel plating, chromium plating, acid copper and acid zinc baths. The unit shown has an overall length of 46 in., and is rated at 3 kw., 330 volts. Weight is approximately 36 lb.

Taylor "Motosteel" Lever Motor

Lever action of the "Motosteel Evenaction" lever motor, manufactured by the Taylor Instrument Companies, Rochester, N. Y., can be reversed by substituting another lever and transposing the fixed and movable pivots. Limit stops are provided

for both up-stroke and down-stroke. Power of either up-stroke or down-stroke can be increased or decreased by a spring adjusting nut. A number of take-off holes are provided throughout the length of the lever so that the force or travel of the motor may be adjusted to suit requirements. Base is drilled for mounting on floor, wall or ceiling.

Three sizes of lever motors are available. They may be operated by remote manual control, by electro-pneumatic switches, or by a pneumatically operated controller.

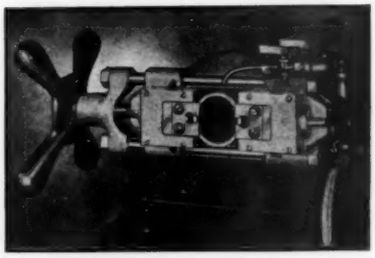


"Red-E" Quick-Acting-Cam Grinder Dog

The quick-acting-cam grinder dog manufactured by The Ready Tool Co., Iranistan and Railroad Ave., Bridgeport, Conn., previously described (*AM*—Vol. 79, page 898) has been redesigned so that a three-point contact is secured no matter what size of work is held in the dog. Setscrews are now put in on a 60-deg. angle, instead of 90 deg. as in the previous design. Four sizes are available, the smallest having capacity from ¼ to ¾ in. diameter and the largest from 1½ to 2 in. diameter capacity.

Beaver Portable Threading Unit

Design of the Model-A pipe and bolt cutting and threading machine, offered by Beaver Pipe Tools, Warrent, Ohio, has been improved to provide a choice of wheel-and-roller or automatic-knife cutoff. This enables the user to select the type of cut-off best adapted to his particular work. The Beaver Model-A machine has a rack-and-pinion feed, uses quick-opening fully-adjustable dieheads and has a full ⅛- to 2-in. range.



Round Table

Private Lives

"What are all these blank forms, Al, more paper work for your clerks? The first thing you know we'll have more clerks than machinists."

"You're way ahead of yourself, Ed. Those are only some sample blanks a salesman left. Why don't you look them over?"

"Employee's applications, eh? Well, these don't look so bad. They give you a line on the men you hire, don't they? Seems to be about the same thing I've seen in other plants. Better get some and put them to use."

"Guess again, Ed. I wouldn't ask any man to fill out a questionnaire like that."

"Why not—don't you want to know something about the men you hire?"

"Yes and no, Ed. I'm most interested in what kind of work they can do and whether they can be depended on for steady work when they're needed."

"Can't you size them up from the answers to these questions? They ought to give you all you want to know about any man."

"That's what they're intended to do, but they don't. Besides, what business of mine is a man's religion and how often he goes to church? Why should I ask if he owns his home and if he has money in the bank?"

"Things like that indicate whether a man is steady and dependable. Why shouldn't you want to know that?"

"Ed, he has more reason for asking us if we have money in the bank to meet his pay check. We're hiring the man's time and skill, not his taxable assets."

"You've a right to know if he's responsible—I don't see why he should mind answering these questions, not if he's the kind of man you'd want to hire."

"He probably wouldn't mind at all, Ed. In fact its quite possible that he'll lie a bit—if he needs a job."

"You ought to be able to tell whether he's lying."

"Not always, Ed. Henry Wolf told me of just such a case last night. An applicant filled in a blank down

at his place and was put to work. Sometime later the employment manager accidently found that the man had lied in about every answer."

"They called him into the office and questioned him. He didn't deny a thing. 'Sure I lied,' he said. 'I needed a job. I've filled in enough questionnaires to know what kind of answers you'd want. If I'd told the truth I wouldn't have a job today.'"

"'You'll have to fire him', says the employment manager to Henry, who is superintendent of the department in which the man had been placed. 'Not on your life,' was Henry's reply. 'He's the best man I've ever had on that deep-draw press and I'm keeping him. I don't care if he lied to get the job, he's making good. I'd have lied a bit myself if I'd been in his place.'"

"So that's the kind of man you want in the shop, is it, Al? I've always thought you wanted men you could trust."

"That's the reason I won't ask any man to fill in this form, Ed. It encourages a man to lie by prying into his private affairs. So long as he gives me a fair day's work, he can live in a tent and spend his money on the horses."

Is Al right about application blanks? Do personal questions secure reliable answers?

Discussion

The Conscientious Workman

A really good mechanic should be able to decide when a strict tolerance is necessary on a repair job and when it is not. I would take time to thoroughly explain the tolerances to him before I would lose a good man.

After finding the mechanic still persisting in being fussy, perhaps it would be possible to convince him that he would be of more value in some other department. This would keep him happy, the firm would still have him on the payroll and he could be replaced by a repair man who understands that the work must be carefully and accurately done, yet has "machine sense" enough to differentiate between "go" and "not go" on a job. Being fussy about non-essentials

is too expensive to be permitted.

However, if the firm wants to keep the present man on repairs and he continues to spend too much time on unnecessary operations, the only solution would be to give him written instructions. Then he will know exactly what needs to be done and how close to make his fits. In my opinion the conscientious workman is one who obeys instructions and tries to keep costs down; doing, at the same time, a first-class job.

—Hugh Muir Mitchell.

The need for conscientious and capable workmen is so great that one hesitates to recommend that Henderson be discouraged in any way. However one of the marks of a good mechanic is that he be able to differentiate between watch-making and boiler-making. He should have some appreciation of where fine work is required and where it is unnecessary to spend money on it. The really good mechanic is one who possess judgment as well as skill.

The solution of the problem is a matter of balance and this rests largely on the shoulders of the foremen and the men responsible for training. —O. W. Winter.

Many people make the same mistake as Ed and Al, who consider Henderson to be an extremely conscientious workman. As a matter of fact, his conscience doesn't enter into this problem at all. He is a timid man, who has been improperly trained.

He is not an "all-round" mechanic, but has been trained only in very accurate work. He is afraid to assume the responsibility of determining the places where looser and less expensive fits should be used. He has never been taught the different degrees of accuracy required in different machines, or even in different parts of the same machine.

A man may be just as conscientious and still make "sloppy" fits. One of the most conscientious men I ever worked with came from the old Ship Windlass Works in Providence. He always wanted to make "salt water" fits, allowing a sixty-fourth for rust. He was simply a product of a narrow type of training.

I do not think that Ed should allow expensive fitting on all parts, so he will get accurate fits on the few which need accuracy. Ed should be very tactful and diplomatic in explaining to Henderson just how and why he should differentiate between the loose fits and the more accurate ones. If Henderson is really conscientious and has real mechanical sense he will try to do the work as Ed asks him to.

If it proves impossible to get him to do the work in the proper manner, Ed could use him on the accurate control mechanism, filling in the remainder of his time with some accurate tool or gage work. Only as a last resort, would I "let him out". Then I would try to find an opening for him in some shop requiring extreme accuracy. Before doing this, it would be well for Ed to "break in" some smart young mechanic. By giving this man personal attention, Ed should be able to produce just the kind of maintenance man he needs for this particular job.

—H. M. Darling.

The Open Door

It is difficult for the employee to see the employer's side and likewise it is difficult for the boss to see the workman's side. If they could meet together, talk over these grievances, and get each other's viewpoints, both would have a different picture of the situation. Little misunderstandings would be disposed of before they grew into serious strikes.

In the course of a day's work there are bound to spring up little misunderstandings. To the persons involved these differences appear mighty important. But if that door is always open workmen will avail themselves of the opportunity to talk things over. And the fact that they can do so will make them think twice before bothering the boss, and only the most important things will be discussed with him. —Roger C. Dickey,
The International Paper Box Machine Company.

How Interchangeable?

To get strictly interchangeable running fits having a total tolerance of 0.002 in. for a 2-in. shaft and its bearings is comparatively easy. If the total tolerance were 0.0005 in. and the parts were simple, strict interchangeability might still be attained, given accurate, modern grinding machines. But if the total tolerance were reduced to, say 0.0002 in., as is essential for vibrationless action of a jig or cylinder borer where only the thinnest of thin oil can find room, then the question of "how interchangeable?" admits of but one rational answer—not at all.

Interchangeability by selection is another matter. Selective assembly from masses of parts may indeed prove profitable, but the amount of selection must be controlled or much time will be wasted in sorting parts to close tolerances.

—Francis W. Shaw,
Whitworth, Lancashire, England.

Wage Increases

If we used the same reasoning in rating men as we do in selling our products, we would not wait for a man to broach the subject of increased pay. When a man asks for a raise and is turned down, management loses his enthusiasm and loyalty. We lower selling prices without waiting for our customers to tell us we should do so. We do this because we feel that it will increase sales.

It is not logical to wait for a man to inform the management that he is poorly paid. Increasing a man's pay because he feels that he is worth more is not sound from the employer's standpoint, but to do so because his services justify it is another story. It is wise to be one jump ahead of dissatisfaction by making a man feel that his work and his efforts are appreciated. —J. Homewood.

Where labor is organized and collective bargaining is recognized as the usual method of obtaining increases in wage rates there is not the same willingness on the part of employers to reward individual merit as formerly. This is no doubt due to the fact that they are aware that in many cases the standard wage rate may be higher than the economic value of a portion of the labor they employ; this prevents them from paying higher rates to those whose skill and effort should be acknowledged.

There is, however, a large number of employees who are outside any organization and who must depend upon their own individual efforts to secure an advance in pay to which their increasing knowledge, skill and experience entitles them. An employee who receives an advance without asking not only doubly appreciates it, but is also assured that his efforts to give of his best are appreciated.

On the other hand, the employer who only gives an advance after repeated applications and then in a manner which leaves no doubt in the employee's mind that he is not considered worth it, would be wiser to definitely refuse the application in the first place. —W. L. Waterhouse,
Hadfield, Bristol, England.

VOLUME 81 • AMERICAN MACHINIST, ESTABLISHED 1877 • K. H. CONDIT, F. H. COLVIN, EDITORS • NUMBER 14

Editorials

Rewrite the Wagner Act

BY THIS time it should be clear to everyone that the Wagner Labor Relations Act, as it stands, is not working and never will work. Senator Vandenberg has offered an amendment that will correct the worst of its faults. The amendment should be passed at once.

Whether it will be considered or not remains to be seen. The Democrats with their enormous majority will have to gulp hard to swallow so constructive a move from the Republican side of the Senate, but they will find it good politics to do so.

Once before the New Deal put an unworkable labor law on the statute books and discovered that it was a liability. The NRA was thrown out by the Supreme Court before it had a chance to show its true power to disrupt the party that sponsored it. To Mr. Roosevelt's discredit it must be put down in the record that he never publicly acknowledged his great debt to the Court for freeing him and his party from that incubus.

But this time the Court has refused to come to his aid. It has ruled the Wagner Act constitutional and the Democrats have been in steadily growing difficulties ever since. Political reporters observe that the Wagner Act and its attendant lawlessness are causing more real dissatisfaction in Congress than the court-packing bill, even though the latter drew from the Senate Judiciary Committee the most stinging rebuke that has been handed to a President in our time.

Public opinion, in the long run, inevitably picks out what is fair and right for support and condemns what is unfair and wrong. Under the Wagner Act, the administration and the C.I.O. have undertaken to force labor of all classes into organized unions with obvious political intent. Unfortunately for them they are finding out that a large part of labor does not want to be organized, and that the great middle class in this country is fearful of the kind of political weapon Mr. Lewis is endeavoring to forge.

PUBLIC resentment against C.I.O. methods is thoroughly aroused and may easily get out of control. There is nothing more dangerous to public order than the vigilante spirit. True friends of the working man will support the effort to rewrite the Wagner Act so that the excesses that have been committed under its protection may not react to hurt him irretrievably. Democratic politicians will be well advised to heed the warning that has been so plainly given.

Business as Usual

AMERICAN BUSINESS, very fortunately, lists among its leaders many many men who are not carried off their feet by troubles of the moment. They do not underestimate the power or importance of major political changes and labor disturbances. They do estimate these factors at their true value and go ahead with their own job of conducting business as efficiently and successfully as possible.

Business has been through international wars, civil wars, overturns of political opinion, frontal attacks by labor agitators, and indirect moves by impractical reformers. But still it goes on because the life of the country depends on it. As one machine tool builder of the younger generation puts it: This country is going to need machine tools no matter what political party controls it, and it is going to buy them from the fellows who know how to build them best.

All through the present epidemic of organization strikes many companies have plodded along doing their best to keep the wheels turning, and laying their plans for the future with confidence that economic forces are stronger than political ones and will prevail in the end.

Only in this way can we account for the flood of orders for machine tools and production machinery of all kinds that has persisted in the face of the most dangerous labor disputes in nearly a score of years. "Business as Usual" may not be quite attainable when labor unrest and government interference camp at your own door, but it can continue to be the major objective for business men.

CHIPS

WASHINGTON

Roosevelt silences press questioners who ask about third term possibilities . . . Washington expresses guarded approval of Michigan's new labor law which gives employers more of a break than they get in the Wagner Act . . . W.P.A. stands firm on dismissal policy despite riots in New York . . . Maritime Commission signs subsidy agreements with 23 companies, leaving five still outside, as mail contracts end . . . Plans for building 28 new ships are under way . . . N.L.R.B. adds examiners as long list of unheard cases grows rapidly . . . Social Security Board takes over job of allocating numbers from Post Office Department which listed more than 29,000,000 . . . Miss Perkins changes her mind on sit-down strikes, agrees now that they are illegal and ill-advised . . . Senate insurgents find substitute court-packing bill no better than original and threaten to filibuster indefinitely . . . "America Speaks" poll on relative popularity of Green and Lewis with voters gives A.F. of L. leader 2-1 lead . . . Roosevelt orders spending agencies to save 10 per cent of the appropriations voted for them by Congress . . . Senate gets revised wages-and-hours bill authorizing Labor Standards Board to establish minimum wage of not more than 40 cents and maximum work week of not less than 40 hours.

FOREIGN

Georges Bonnet, new French finance minister, gets authority until August 31 to restore national finances . . . Franc is cut loose from the gold standard of October, 1936, and is expected to drop to 4 cents with sharp rises in taxes, living costs and transportation charges . . . Japanese sink one Russian gunboat, beach another in border fracas on the Amur River . . . Soviet defense loan of $800,000,000 is floated as Litvinoff strives to prevent serious results from Amur River fight . . . Nazis imprison Protestant ministers . . . Great Britain announces that she will not tolerate interference with Spanish sovereignty or with free access to the Mediterranean . . . Strong statement plus changed complexion of French government makes Fascist leaders pause . . . Madrid forces launch attack on besiegers . . . U. S. and British survey planes fly on schedule between Ireland and Newfoundland.

INDUSTRY

Newspaper publishers announce their "unalterable opposition" to the closed shop for reporters and editorial writers, say it is not an economic issue . . . Bombing of Cambria Steel water supply throws many out of work and serves further to intensify the feeling against C.I.O. terrorist tactics . . . Roosevelt tells press conference that public is fed up with both sides in the steel union scrap . . . Gov. Townsend of Indiana discovers a peace formula acceptable both to Inland Steel and C.I.O., and mills reopen as troops are demobilized . . . N.A.M. asks cooperation of responsible labor unions in curbing strikes . . . Back-to-work drive wins in Canton as troops arrest rockthrowing pickets, 200 strikers indicted at Youngstown . . . C.I.O. addresses franked copies of Rep. Maverick's attack on Ford to Ford employees . . . Police capture would-be dynamiters of freight train for Bethlehem's Cambria works . . . Heavy showers spoil United Mine Workers' demonstration at Johnstown as Gov. Earle warns them that they must have public sympathy to win . . . Republic reopens Cleveland mills under troop guard . . . S.W.O.C. ask for Cambria vote, withdraw pickets . . . Warrants out for Ford men who beat up C.I.O. men . . . Reporters and news photographers testify that Frankensteen and Reuther were beaten up by "dago hoodlums" . . . Labor Board refuses to hear Ford Brotherhood representatives.

INDICATORS

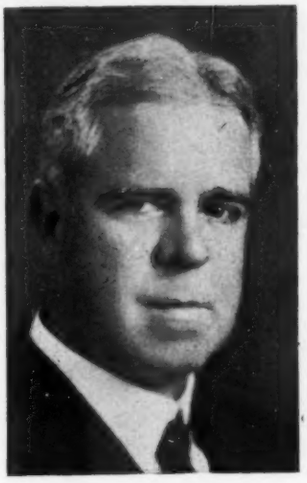
Steel production drops still further . . . Electric power output declines seasonally . . . Business Week's Index recovers slightly to 78.4.

Work Was the Order of the Day at the A.S.T.M. Annual Convention

Alfred E. White, University of Michigan, along with other newly elected officers, takes over the reins for the coming year

NEW YORK—Sessions of 200 various committees on every phase of testing and materials, 19 discussion groups and an exhibit by over 40 companies, completely occupied the attention of the 40th annual convention of the American Society of Testing Materi-

Heads A.S.T.M.



A. E. WHITE

als held in New York June 28–July 2. An attendance of over 1,500 registrants topped all previous records since 1931.

Of interest to the production and metal-working fields were the sessions on the fatigue of metals and the effect of high temperatures. Some methods of testing of steel and of weld metal were outlined in a session on steel, wrought iron, metallography. Corrosion of iron and steel and of non-ferrous metals and alloys was discussed as well as methods of testing procedures. L. W. Hopkins, American Chain Co., gave a digest of corrosion-testing procedure.

While the session on test methods was, generally, too academic for general production fields, one or two papers were of interest. R. H. Heyer, the American Rolling Mill Co., spoke on the method of analyzing the Brinell hardness test. Rudolph K. Bernhard, Baldwin-Southwark Corp., discussed and illustrated by motion pictures the "Dynamic Test by Means of Induced Vibration."

H. L. Campbell, American Hoist & Derrick Co., discussed the "Relation of Properties of Cast Iron to Thickness of Casting" in a session on cast irons. W. E. Mahin, Westinghouse Electric & Mfg. Co. and J. W. Hamilton, Vanadium Corp. of America, presented "A Proposed Standard Classification of Graphite in Gray Cast Iron."

A session on non-ferrous metals closed the meeting. "Fatigue Studies of Non-Ferrous Sheet Metals" by C. H. Greenall and G. R. Dohn, Bell Telephone Laboratories, Inc., and a talk by H. L. MacBride, Tinius Olsen Testing Machine Co., on the stiffness of metals were of interest. Data included in the latter discussion of the new Olsen stiffness tester for thin sheets and small wires.

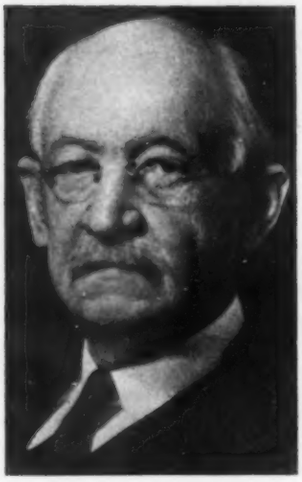
The 12th Edgar Marburg Lecture, given by Dr. P. Smith Taylor, manager, Engineering Laboratory and Experimental Laboratory, Diehl Mfg. Co., outlined briefly most of the major plastics now in use.

S.P.E.E. Stresses Training In Public Service For Engineers

The broader aspects of engineering education and the necessity for training students for more effective social service as practising engineers featured the 45th annual convention of the Society for the Promotion of Engineering Education, held last week at Cambridge, Mass., under the joint sponsorship of Massachusetts Institute of Technology and Harvard University. The total registration was 1,571, or about 60 per cent of the entire membership. While engineering pedagogy formed the backbone of the program, the tremendous importance of the engineer's functioning on a higher plateau of public service amid present-day problems was the underlying theme of the conclave. In his convention address President Harry P. Hammond voiced this need, and inspiringly outlined the intangible qualities that differentiate the great teacher from the instructor.

President K. T. Compton, Massachusetts Institute of Technology, discussed the relation between educa-

Receives Lamme Medal



F. E. TURNEAURE

tional institutions and industry. Henry M. Wriston, president, Brown University, challenged the contention that a dead center has been reached in economic productiveness.

Dean F. E. Turneaure of the University of Wisconsin received the Lamme medal of the society.

New S.P.E.E. Officers

PRESIDENT
S. B. Earle
Dean, Clemson College

FIRST VICE-PRESIDENT
Karl T. Compton
President, Massachusetts Institute of Technology

SECOND VICE-PRESIDENT
F. C. Bolton
Dean, Texas A.&M.

TREASURER
W. O. Wiley
New York

SECRETARY
F. L. Bishop
University of Pittsburgh

COUNCIL
G. F. Eckhardt
Dean, University of Vermont

S. C. Hollister
Dean, Cornell University

D. S. Elliott
Professor, Tulane University

F. M. Feiker
Executive Secretary, American Engineering Council

R. W. Sorenson
California Institute of Technology

A. E. White
Professor, University of Michigan

F. B. Seeley
University of Illinois

Japan Launches Program for Consolidating and Expanding Machine Tool Industry

Department of Commerce and Industry starts a five year plan for promotion of national-defense industries.

TOKYO—Japan's Department of Commerce and Industry is now well launched on its five-year plan for promotion of national-defense industries. The scheme includes mining, metal production and machinery manufacturing. The last mentioned line will be developed by consolidating lesser enterprises throughout the country. It is suggested that to achieve the same end a new semi-official corporation be formed with the five big makers of machine tools financially participating. It is planned that the proposed company take up lines other than those followed by the major manufacturers. Foreign engineers and technicians may be employed to direct the operations. Drafts for new corporate laws, which may be applied to this enterprise for the first time, are being prepared for the next Diet.

There is a growing section of official opinion in favor of granting subsidies to machine-tool manufacturers. The idea is being put forth in view of the "conservative attitude" maintained by manufacturers with regard to preparations for an emergency capacity, so much desired by military authorities. The official plan, as suggested, is to enable manufacturers to expand beyond their present requirements and to enable them to write off mechanical depreciation over a shorter period.

In line with the Department of Commerce plans, Gisuké Aikawa, president of the Nissan combine, is developing, with the support of official quarters, a plan for large-scale manufacture of machine tools. A technical staff will be formed by recruiting talent from the diversified enterprises under Nissan control. The new enterprise is expected to be launched with a nominal capital of $5,750,000. It is expected that the government will take a financial interest in the enterprise in one form or another.

Mr. Aikawa is the president of the Nihon Sangyo (Nissan) concern, Japan's largest industrial holding company. Almost overnight he has built up Japan's leading automotive combine, the Nissan-Hitachi group. His present machinery plans may have been prompted by a desire to render the enterprise independent of American tool supply.

Looking for Foreign Talent

The Army and Navy, it is reported, are now in favor of employing foreign engineers in prosecution of their plans for extension of mechanical productivity. Although the matter of training machinists has been taken up by the Department of Commerce as well as by educational authorities, it will be impossible to catch up with the rapidly expanding demand for skilled machinists. This has caused the radical change in the attitude of the service authorities who heretofore would not allow a foreigner to even inspect Japanese machinery plants.

Heads Nissan Combine

Leopold

GISUKE' AIKAWA

Machine Tool Notes

According to a report of the Department of Commerce and Industry, the machinery and tool trade shows an increase of 265.4 per cent over the 1931–33 period. This places this industry well ahead of all other of the heavy industrial trades.

The Tokyo Gasudenski Kogyo (Tokyo Gas & Electric Industry), one of the "big five" machine-tool makers, will add a new plant for the extension of tool manufacture. It is expected that this plant will increase production by 50 per cent.

Chosen Kiakai Kogyo (Korean Machinery Industry) recently formed as a joint enterprise of the Showa Mining concern and Yokohama Industry, will start operation in August at its plant near Jinsen. In addition to mining machinery, the company will manufacture iron molding and other machinery.

Aichi Tokei, of Nagoya, manufacturer of clocks, precision machinery and airplanes, is placing orders for a new aircraft plant. It is expected that the bulk of the $500,000 outlay for new installations will be through foreign concerns.

Teikoku Koku Koki (Imperial Aircraft & Machinery), a new enterprise promoted by reserve naval officers, has already taken steps for installation of new machinery. It is expected that foreign machinery will be used in this enterprise.

The Mitsui Bussan Kaisha has opened a number of agencies for American machinery. These include gear-hobbing, lapping, die-casting machines, drop forging hammers, boring and grinding machines, hydraulic cold riveters, sound testers, and involute checkers. An exhibition show was held in the middle of June.

The Kokko Chain Steel Co. has completed its new factory at Sakai, Osaka prefecture, where ship anchor chains will be produced by a new process direct from steel billets. These are expected to replace the chains thus far imported from England. The halves which are stamped from steel billets are welded together into a chain ring by electric arc. The product has been made standard for merchant marine and warcraft by the Communications and the Navy Ministers.

Carrier Corporation to Move to Syracuse

Carrier Corp., Newark, N. J., who recently purchased the Franklin Auto Plant in Syracuse, N. Y., has been offered a sum of $250,000 raised by the business men of Syracuse. It is expected that the money raised will be applied towards moving expenses and improvement of the property which has 1,250,000 sq. ft. of floor space.

Some 80 per cent of the administrative and production operations of the air-conditioning manufacturer is expected to be transferred to Syracuse within a year, the Carrier Corporation having outgrown its present facilities in Newark.

WATCHING Washington

Senators attempt to talk down court-packing bill . . . Part of President's reorganization plan may pass . . . Black introduces amended wage-hour measure . . . Vandenberg seeks equitable labor legislation.

WASHINGTON—Senate tempers rose with the thermometer in a series of sessions devoted to attempts to bring the revised court bill to a vote. Court proponents attempted to avoid or limit a filibuster by those who said they could see little difference in the intent of the compromise measure which would enable the President to appoint four new Supreme Court justices at the rate of one each calendar year and the abandoned bill which would have sanctioned six new justices in one swoop. Both bills, opponents claimed, would result in executive domination of the judiciary.

Not Even One or Two

Some of the opponents fear that the President's side could win one or two more justices. Hence a parley was held on Monday night following the Jefferson Island harmony weekend under the guidance of the anti-court-packing leader, Senator Burton K. Wheeler, of Montana. The result is a filibuster which threatens to continue even on a one or two justice increase. Either the President must surrender, which seems unlikely, or the session is certain to be prolonged to the detriment of other Administration legislation.

It also remains certain that the President cannot get more than a fraction of what he wants in the way of government reorganization. He can get the anonymous secretaries, if he wishes, and a few other things but nothing to which there is deep-seated objection.

Most other business was sidetracked by the court controversy, but Senator Black managed to introduce his revised wage-hour bill last Thursday. Amendments to the bill would enable the proposed Labor Standards Board to set a minimum wage not to exceed 40 cents an hour and a maximum work week of not less than 40 hours. This formula is really a reversal of the original bill which fixed the same limits as minimum standards. Senator Walsh gave as the reason for the reversal that the Senate Committee on Education and Labor felt that too drastic a transition from prevailing hours and wages in small businesses might increase unemployment.

The bill proscribes employment of children under sixteen years of age, and of those under eighteen where the occupation is hazardous, on goods sold in interstate commerce. Persons engaged in agriculture and children working for their own parents are exempted except that the Children's Bureau of the Department of Labor would have jurisdiction to prevent the working of children during school hours. The board would be empowered to permit wages lower than the minimum to learners and apprentices under certain conditions and to persons whose earning capacity is impaired by age or physical or mental deficiency.

The initial effect of this bill, if it becomes a law, will be an increase in the demand for machinery as a result of mechanization by manufacturers in an effort to prevent cost increases. But that would be temporary. The 40-cent minimum wage would be practically unnoticed in the metal-working industry, as would child labor, which is all but unknown. The 40-hour week might upset emergency production in many plants.

Labor Limits Board

Up to now, organized labor has thrown cold water on the wage-hour legislation with faint praise. Both C.I.O. and the A.F. of L. took definite exception to any board that would trespass in the field of collective bargaining. Labor organizers lose most of their sales talk when the government undertakes to fix hours and wages. Obviously the limiting of the board's powers in the amended bill was in response to these objections.

Object of the Vandenberg amendments to the Wagner Labor Act is sauce for the labor gander as well as for the employer goose. In explaining his proposals the Michigan senator pointed out that a more effective labor policy would be assured by providing a more impartial one; machinery that can be invoked by only one party to a dispute can never develop satisfactory results.

Despite these contentions there is a general feeling in Congress that little hope can be felt for the passage of such legislation at this session.

Union Unity

Reports of union between the American Federation of Labor and C.I.O. are important, but not for the immediate future. Eventually the two organizations will merge, but certainly not in this calendar year. It is not in the cards.

Someone must make the first move. William Green cannot make it. It would be construed not merely as weakness, but as surrender. John L. Lewis cannot afford to make it now or for some time to come. He would lose too much. It would discourage important unions considering a bolt to C.I.O. from the Federation. It would deter embryo unions from attaching themselves to the newer organization. Even more important, it would seem to indicate that all the reports about a sharp setback for C.I.O. are true.

Watch out for a move which will get somewhere on a real union of the two outfits some time next year—almost surely before the presidential election.

No one doubts that C.I.O. has received a setback so far as popular opinion is concerned. But it would be a mistake for employers to take this too seriously. For example, the President quoted Charles P. Taft as saying that the majority of public opinion was "a plague on both your houses," adding that he agreed this was accurate as to popular opinion.

Much more interesting, however, was the fact the President refused—in answer to a direct question—to say he agreed with this popular opinion! Which refusal, though of extraordinary significance, escaped most if not all the newspaper accounts.—CARTER FIELD, *Washington Bureau, McGraw-Hill Publishing Co.*

House of Representatives Passes Apprentice Bill

A bill providing continuation of the work of the federal committee on apprentice training has been passed by the House and awaits action in the Senate. Congressman William Fitzgerald, of Connecticut, introduced the measure as a result of refusal of the appropriations committee to approve an apprentice training item. As a matter of policy the request was passed to Congress. An operating fund of $57,000, same as last year, is assured if the bill is enacted. No considerable opposition is expected in the Senate. Hearings revealed both employers and workers substantially favoring the enterprise. But legislative rush might leave it high and dry.

The bill directs the Secretary of Labor to foster labor standards in apprenticeship by contract between employers and worker groups, cooperating to that end with the National Youth Administration and the office of education. FCAT, under the labor department, deals with the apprentice as an employed worker; the office of education, Department of Interior, deals with him as a student.

FCAT's objective, briefly, is to give profitable employment and responsible citizenship to young persons, and to maintain an economic level in the supply of skilled workers for the technical industries and occupations.

The census of 1930 showed 750,000 men and women under 25 employed in skilled trades, but receiving no training. Employers who have conducted sound training programs are its staunchest advocates, the committee reports. Large numbers of foreigners immigrated to do our skilled work until the bars were put up. Then for a time it was erroneously believed that automatic machines would reduce the demand for skilled workers. After the war great emphasis was laid on academic education; craftsmanship became unattractive to youth. The depression terminated most of such training programs as had existed. During the past five years the ranks of skilled workers have continued to shrink, so that now a craftsman shortage appears as soon as a trade reaches 75 or 80 per cent of normal.

New Departure Honors 325 Long Time Employees

New Departure division, General Motors Corp, gave a banquet, July 8, in honor of 325 employees who had completed twenty or more years of service with the company. All were presented with gold service buttons designating the number of years of service. Those having served more than 25 years (123 in all) received Hamilton watches appropriately inscribed.

Emphasizing the small turn-over and the very satisfactory employee relations, F. G. Hughes, general manager, in his talk to the group, stated that the 8,016 employees at Bristol and Meriden, Conn., had an average service record per employee of 6.6 years.

General Motors Continues Expansion in New Jersey

General Motors Corp., continuing its decentralization program, will begin construction within a few weeks of a new eastern plant in Clark Township, south of Cranford, N. J., it was announced last week. It is designed primarily for a service and stock plant for the Inland Division of the corporation for shipment to eastern assembly plants and for export markets. The division manufactures steering wheels, running boards, motor mountings and rubber and metal parts for automotive, refrigeration and radio uses.

The Cranford plant will have approximately 100,000 sq. ft. of floor space and completion is expected within three or four months.

Bendix Begins Construction

Major portions of ten buildings contracted for by Bendix Aviation Corp., at Bendix, N. J., will be completed by November, according to Vincent Bendix, president. Approximately 2,500 persons will be employed when building is completed.

Of 500 acres purchased or under option, 100 have been laid out for immediate construction of research and manufacturing buildings and future expansion.

Industrial Review

• SUMMER SOMNOLENCE seems to have overtaken the business of buying machinery. In most parts of the country orders have fallen off. Some shops have started their seasonal shut-downs, and machinery dealers, following suit, are taking the opportunity to give their forces vacations. But behind the high humidity there is strong conviction that this slackness is only temporary. That resumption of recovery, the underlying urge to restore operating efficiency and the evaporation of much of the present uncertainty will see large scale buying resumed with the return of cooler weather.

• NEW ENGLAND AND NEW YORK are typical of most sections, with a fair volume of orders being placed but with a decided slowing up during the past two weeks. Business in the Philadelphia district is moving along on an even scale with no indication of a spurt in sight yet. Some improvement is already apparent in Pittsburgh after a quiet June. Inquiries and orders are moving ahead and point to a return to the high levels of the earlier months.

• CINCINNATI ANTICIPATES some recession during July and August but looks forward to better business for the balance of the year. There are signs that the natural trend is still upward. While not as good as earlier in the year, machinery sales continue active in Toledo. Some orders are being held up, but there is a big potential demand for machine tools. In Cleveland the July volume is down considerably.

• DETROIT SALES OF EQUIPMENT have materially decreased, and inquiries have dropped off as well. It looks as though August also will be quiet, but things should start moving in September. Sales are steady at a reduced level in Chicago. Fall months are expected to show a decided return because the volume of new inquiries is increasing. Milwaukee, too, has felt a falling off in orders recently from the high levels of June which was one of the largest months in this city's history. Some shrinkage is anticipated for the next two months. While there is a good deal of equipment under consideration in St. Louis, the summer lull has been felt there also. Machine tool business on the Pacific Coast shows no indication of approaching spring peaks and little improvement is looked for before fall.

Detroit LETTER

Production may reach 5,000,000 mark . . . Equipment buying complete except for scattered plants . . . Assembly of 1937 models slowing down . . . Labor situation quiet as U. A. W. settles internal affairs . . . $7.26 Ford average daily pay

DETROIT—With the labor hubbub quieted down, the motor industry views the future more optimistically. It is pleased with production and sales in the first half of 1937 and foresees good business the remainder of the year. It thinks that '38 will be a satisfactory year. The super-enthusiasts go so far as to predict that total production for the five-year period beginning next Jan. 1 will exceed that in the five previous years. To do that the annual assemblies for 1938 to 1942 inclusive would have to average over 3,720,000 units.

5,000,000 Cars

Unless labor should unexpectedly get rambunctious, thus paralyzing production, output this year will attain the 5,000,000 mark set originally as the industry's goal. In the Jan.-June period about 2,895,800 units were built. The monthly average during the last six months of '37 will have to be 335,000 if the year's total is to be 5,000,000. Last year it was 314,000. That task ought not be so hard in view of the short tooling periods ahead and the early date for the New York Show which should result in a longer fall selling season and greater production.

Curiously, in each of the last two years 57 per cent of total assemblies were in the first half and 43 per cent in the second half. Also in each year dealers sold 43 per cent of their passenger cars in the first five months. This year's performance in both production and sales seems to be following that of 1936 and of 1935, except that the volume is on a higher plane.

Records are being shattered by car manufacturers, despite the fact that strikes have interfered with operations and plant efficiency has declined as the C.I.O. made serious inroads. It took General Motors only seven days longer this year than last to make one million cars and trucks. Chevrolet completed its 13,000,000th car on July 7, its last 1,000,000 having been built in less than eleven months (a remarkable record in view of strike interruptions).

The General Motors program for expanding its parts and accessories manufacturing divisions is rounded out for 1938 by announcement of a branch plant to be erected at Cranford, N. J., by the Inland Mfg. Division. The new plant will stock parts made at Inland's Dayton, Ohio, plant and will produce parts for G. M.'s eastern assembly plants and for export. It will be G.M.'s sixth factory in New Jersey.

Equipment Buying Over

Most equipment buying programs for next year have been well cleaned up. However, Ford is a steady purchaser of machine tools and other companies are ordering odds and ends to wind up their immediate requirements. Independent makers have bought sparingly. Nash is spending $1,500,000 on rehabilitation of its various Wisconsin factories, but its big expenditure for plant modernization is reported to have been postponed until next year. At that time it will go to work on a program costing several million dollars for sweeping changes in its machining set-ups.

International Harvester is in the midst of purchases for its new engine plant at Indianapolis, which will turn out around 700 motors a day. Incidentally International is said to have a sizable tooling program for its tractor division. Allis-Chalmers too is on the verge of heavy buying for tractor production.

General Motors and Chrysler will continue operations on current models well into August, but other companies will stop earlier for changeovers. Ford is reported considering closing the Rouge plant for vacations and inventory purposes the last two weeks of July and possibly the first week of August. It propbably will resume on present models in August; it has followed that practice in the past. Packard has completed most of its parts manufacture on '37 models and will end assembly operations before the end of the month.

Stocked for Future

Car makers already are ordering new sizes of steel for '38 models. They have made no attempt to reduce stocks on unchanged sizes, preferring to keep them at about a month's level. The matter of maintaining stocks of materials and parts in sufficient quantities to avoid stoppages in case of strikes in suppliers' plants is of great concern to the automobile industry. The eight-story former engineering building of Hupmobile is packed from basement to roof with tires, mostly belonging to Chrysler. Ford is said to have run trainloads of tires into the Rouge plant and paid heavy demurrage prior to the Firestone strike.

The automobile people have never attempted to store bodies because of the huge space needed. Nevertheless Ford is known to have considered erecting a special warehouse in which to store Lincoln-Zephyr bodies made by Briggs. In this way it would be possible to keep a week's supply of bodies on hand, but that would be an expensive protection against trouble. In fact, the extra handling of materials necessitated by present storage of parts has run up manufacturing costs sharply.

Design changes for 1938 aren't enough to get excited about. Fenders, hoods and radiator grilles will be altered as usual and some cars will go another degree toward streamlining their bodies. More die-cast grilles and greater use of stainless steel for grilles are looked for. Mechanical changes will be slight. Oldsmobile will offer its automatic transmission as optional on its six as well as the eight. The Buick 40 also will have this transmission. Despite reports to the contrary, LaSalle will not adopt it. Two or three independent companies are reported to have decided upon a power shifting device used in connection with the conventional transmission with or without the overdrive. The usual gear shift lever is eliminated and the

effect is equivalent to a semi-automatic transmission.

Coil Springs for Buick

Buick will have coil springs at the rear as well as at the front, but will retain the rear axle and torque tube drive. This means that Buick will not have full-fledged independent springing in the rear, as earlier indicated, but will try to achieve with the modified design the desirable effects of such springing. Cast-iron pistons appear to be waning in popularity and aluminum pistons gaining in favor. Steel-backed babbitt-lined bearings will be in considerable vogue. Application of plastics, especially for such items as the instrument board, is growing. In going to the all-steel top, Packard may use a wider steel sheet than most companies. However, Lincoln-Zephyr, for its coupe, will continue to be the only manufacturer specifying a 90-inch sheet. The remainder will be satisfied with narrower sheets.

The labor situation appears more favorable. The United Automobile Workers have been so busy with internal wrangles that they haven't yet given "satisfactory assurances" against unauthorized strikes to General Motors, as demanded by the corporation prior to negotiations for changes in the present contract. However, neither side has any intention of terminating the contract. There is a misconception on the part of some people that the G.M. contract expires Aug. 11 unless it is renewed. The fact is that the pact runs perpetually unless either party asks for its termination. Either party also has the privilege of seeking changes in the pact after Aug. 11. There hasn't been an unauthorized strike in General Motors for almost three weeks. This is cited as proof that U.A.W. officers could have stopped the "quickie" strikes sooner if they had made an earnest effort.

Detroit regards it as a foregone conclusion that the National Labor Relations Board will rule against Ford in the present hearing at Detroit of charges filed by the U.A.W. On the other hand, many think Ford on solid ground in contending if the board's rulings are adverse, they will abridge the company's constitutional rights and the higher courts will restrict the board's authority. The U.A.W. isn't getting far yet with its Ford membership campaign.

Ford Wages

The average daily wage of Ford workers at the Rouge plant today is $7.26, or 90¼ cents an hour. Only 5598 workers, consisting of sweepers and other unskilled employees, receive the minimum pay of 75 cents an hour or $6 a day. The largest group of workers, numbering 29,464, receive 90 cents an hour or $7.20 a day. The work-week is five days of eight hours each, yielding a weekly wage of $36. In the second largest group are 22,532 workers who receive 85 cents an hour or $6.80 a day, while 11,450 workers get 95 cents an hour, or $7.60 a day. One dollar an hour is paid to 5431 men. 8277 employees receive from $1.05 to $1.65 an hour.

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Detroit Rex Products Co., manufacturer of degreasing machines, Detroit, is erecting a building of 30,000 sq.ft. This second addition within a year will house engineering and research groups.

Aluminum Company to Spend $15,000,000 at Alcoa Plant

The Aluminum Co. of America last week announced a $15,000,000 expansion program at its Alcoa, Tenn. plant. This was accompanied with the signing of a new agreement with the Tennessee Valley authority for $1,500,000 worth of power annually.

The additional power will be used for the production of virgin aluminum and for the additional fabricating units, electrical installations and housing facilities required in the program. The present force of 5,000 employees will be doubled, according to A. D. Huddleston, resident manager of the company.

Commerce Department Desires Information on Export Results

In an effort to track down the experiences of various machinery manufacturers, Lewis M. Lind of the Machinery Division, Department of Commerce, has made a plea that manufacturers informally and briefly notify the Bureau on the results of following up the export opportunities presented in the Department of Commerce bulletin, part of which are reproduced in *American Machinist*. At the present time, the Bureau, except on rare occasions, has no means of knowing whether or not export information which they furnish has been successfully followed up. Also, Mr. Lind feels that certain factors discovered in dealing with foreign countries, by one company, will serve a useful purpose in solving the problems of others in dealing with those

How Machine Tools Serve You—**Exhibit of National Machine Tool Builders' Association at Great Lakes Exposition shows how machine tools have decreased hours of work, increased hours of leisure, aided agriculture, brought home comforts within the reach of everyone's purse, given low cost transportation and enabled the head of the family to give his children a better education. Animated charts show the increase in earning power, the increase in number of jobs and the improvements in goods with growing use of machine tools**

Westinghouse Man Dies

Blank & Stoller

WALTER CARY

Walter Cary, Vice-President Westinghouse Electric, Dies

Walter Cary, vice-president, Westinghouse Electric & Mfg. Co., died at his home in New York July 2. He was 66 years old.

After graduation from Harvard in 1893 he entered business with George Gibbs in the Gibbs Electric Co., Milwaukee. In 1899 Mr. Cary with several other Milwaukee citizens formed the Milwaukee Electrical Co. for the manufacture of dynamos and motors. He served as vice-president and, later, president of this firm. He joined the Westinghouse Lamp Co. in 1904, becoming vice-president and general manager and later president.

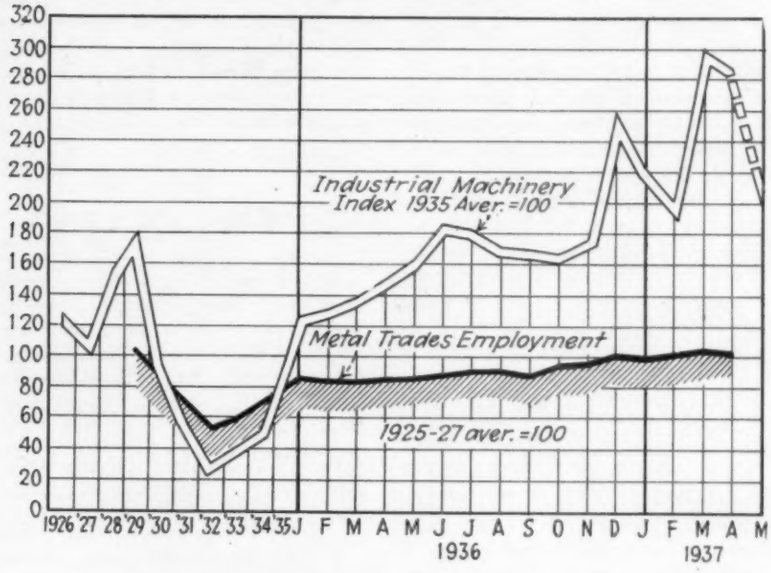
In 1917 he was made vice-president of the parent company. Later he became president of the Bryant Electric Co., Bridgeport, Conn., and of the Westinghouse X-Ray Co.

Mr. Cary was active in the affairs of the Electrical Manufacturers' Club, having served as secretary for five years, vice-president for one year and president for one year.

Twenty-Three Teachers Attend Welding Course

Twenty-three professors and instructors, representing twenty-one different colleges and trade schools, attended a recent five-day special course in arc-welding design and practice, held in Cleveland under the sponsorship of the Lincoln Electric Co. They attended morning and afternoon sessions at the Lincoln plant and evening sessions at John Huntington Institute.

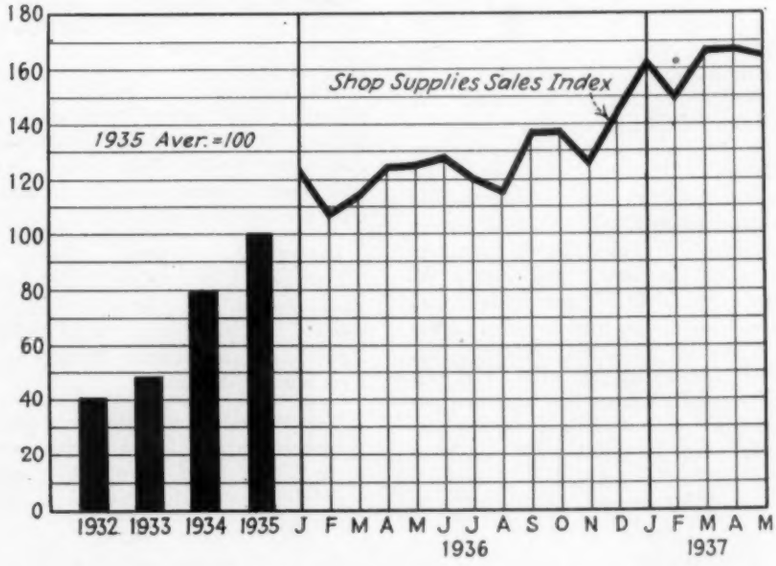
Industrial Machinery Index Drops Sharply



Forecast by the sharp drop in machine tool orders in May, the first report to come through, American Machinist's Index of Industrial Machinery Orders dropped abruptly for the month. With two of the seven factors still to be heard from the Index stands at 213, which is still a pretty satisfactory figure.

Despite labor unrest in several centers the labor barometer of the National Metal Trades Association remained above the 1925-27 average.

Shop Supply Sales Index Recedes a Trifle



By contrast with the sharp drop in the Machinery Index the recession of the Shop Supply Index is very moderate. It declined only 3 points in May to 165.

Machine Tool Employment Almost Equals That of 1929

Employment in the machine tool field in April of this year was only 3.9 per cent less than it was in 1929 according to figures released by the National Industrial Conference Board. In comparing figures for April with those of '29 the Board finds that reductions in the length of the working week do not appear to have had any direct relation to employment. In the following table the first column shows increase in per cent of employment since 1929 and the second column shows decrease in the working week in per cent:

Iron and Steel	8.7	24.6
Electrical manufacturing	7.1	15.2
Automobile	6.3	9.4
Miscellaneous foundries and machine shops	5.2	12.7
Foundries	0.8	14.0
Heavy Equipment	—1.0	14.1
Machines and machine tools	—3.9	9.0
Hardware and small parts	—7.4	10.3
Agricultural Implements	—10.1	18.1

Farrell-Birmingham Honors Old Employees at Dinner

As a mark of appreciation for long and loyal service 144 men were presented 25-year service pins by Farrel-Birmingham Company, equipment manufacturers, Ansonia, Conn., at a banquet on June 17.

Six veterans who had been with the company for more than fifty years were seated at the head table with the toastmaster and president of the company. Of the men present, 100 had over 30 years' service to their credit and 37 had over 40 years.

Toastmaster at the banquet was Nelson W. Pickering, president of the company. With him and the 50-year veterans were Charles F. Bliss, former president; Franklin Farrel, Jr., chairman of the board; and James W. Hook, president, Geometric Tool Co., and head of the New England Council. In his welcoming address, Mr. Pickering stated that of the 800 employees of 25 years ago, eighteen per cent were present; and of the 500 employees of 1900, ten per cent were present.

Bendix Expands

The Bendix Corp., already in the automotive and aviation industries, will enter the home appliance industry as the Bendix Home Appliance, Inc., in Detroit. The first product will be a fully automatic home laundry. D. O. Scott, one of the developers of the Lokheed hydraulic brake, will be president; J. S. Sayre, formerly assistant to the president of RCA Mfg. Co., will be vice-president in charge of sales; O. C. Lang, formerly vice-president, Hydraulic Brake Co., will be vice-president.

PERSONALS

Myron C. Foy, president, Desoto division, Chrysler Corp., has been appointed chairman of the Show Committee in charge of the National Automobile Show to be held at the Grand Central Palace, New York, N. Y., Oct. 27–Nov. 3.

W. A. Armstrong, Dayton, Ohio, was elected vice-president, Nash-Kelvinator Corp., Detroit.

W. R. Wuest has been elected president, Junkin Safety Appliance Co., manufacturers of safety guards for presses, hammers and power shears, Louisville, Ky. J. I. Junkin was made vice-president and J. H. Wuest secretary and treasurer. Mr. Wuest succeeds the late John C. Junkin.

W. C. Stewart has been appointed a technical adviser of the American Institute of Bolt, Nut and Rivet Manufacturers. He succeeds W. P. Acres, who recently resigned to take a position with the Bethlehem Steel Co., Lebanon, Pa.

Donald C. Bakewell has been elected vice-president, Blaw-Knox Co., Pittsburgh.

William E. Smith, secretary-treasurer, Southington Hardware Co., manufacturer of hardware specialties and tools, Southington, Conn., has been made general manager to succeed the late James H. Pratt.

Henry J. Kuehls, Dardelet Threadlock Corp., New York, has been elected vice-president. Matthew C. Brush, formerly head of the American International Corp., has been made a director.

Harvey Demmon, formerly master mechanic Farrell-Mercer works, carnegie-Illinois Steel Corp., has been appointed superintendent of maintenance.

Paul Fielden, credit manager, Norton Co., Worcester, Mass., has been elected president, National Association of Credit Men.

Thomas J. Watson, president, International Business Machines Corp., New York, the newly elected president of the International Chamber of Commerce has been decorated with the new order of merit of the German Eagle by Adolf Hitler. He is the first American so decorated.

Everett D. Graff, first-vice-president, has been elected president of Joseph T. Ryerson & Son, Inc. Edward L. Ryerson, Jr., is now chairman of the board of the Ryerson Co., and vice-chairman of the Inland Steel Co., the parent organization.

Austin J. Paddock has been appointed manager, Elmira Heights, N. Y., plant, American Bridge Co., succeeding Harry L. Rankin who has been placed in charge of the opening and rehabilitating a company plant in Trenton, N. J., which has been closed for the past five years.

A. Kirk Cameron, formerly vice-president and general manager, Eastern Steel Products Ltd., Toronto, Ont., has been elected president to succeed the late James Playfair.

Henry R. Hortenstine, vice-president and chief engineer, has been elected president, Hunter Steel Co., Pittsburgh. He has been with the company and its predecessors for 21 years. Paul A. Smith is now vice-president and general manager.

H. F. Boe is now commercial manager, Westinghouse Electric & Mfg. Co. He will also retain his post as eastern district manager of sales.

W. H. Sadler, formerly of N. W. Ayer & Son, Inc., has been named director of public relations for the Edward G. Budd Mfg. Co., Philadelphia.

A. C. Downey is now president, Airtemp, Inc., Chrysler subsidiary for the manufacture of air conditioning equipment.

Norman C. Branch is now supervisor of production materials, New Departure Division, General Motors Corp., Bristol, Conn.

W. E. Knox has been appointed assistant general manager, Westinghouse Electric International Co., New York. He has been with the Westinghouse organization since 1921.

W. H. Blackmer, formerly sales manager, Laminated Shim Co., Inc., Long Island City, New York, has accepted the vice-presidency and general managership, Packless Metal Products Corp., manufacturer of seamless flexible metal hose, packless fittings and other products, 37–14 Twenty-ninth St., Long Island City.

OBITUARIES

Frank Disston, Executive of Henry Disston & Sons, Dies

Frank Disston, vice-president, Henry Disston & Sons, saw manufacturers, Philadelphia, died July 4 after a month's illness. He was 57 years old. Mr. Disston was a son of Albert H. Disston and a grandson of the founder of the company.

J. L. Underwood, Former Typewriter Maker, Dies

John L. Underwood, 80, retired chairman, Underwood-Elliott-Fisher Co., Hartford, Conn., died July 2. With his brother, he founded the Underwood Typewriter Co. When Underwood interests were merged with the Elliott-Fisher Company, he became chairman of the board.

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WILLIAM D. REID, director and former vice-president and secretary, Follansbee Bros. Co., sheet metal products, Pittsburgh, died June 23. Mr. Reid was 69 years old and had been with the company for over 40 years.

HENRY W. MORGAN, president, Morgan Machine Co., Inc., Rochester, N. Y., died June 17. He was 74 years old.

FREDERICK L. MACKINTOSH, former superintendent, Winchester Repeating Arms Co., died June 29 at the age of 73. He had been with the Winchester Company for 45 years when he retired in 1930.

GEORGE T. SANDS, chief inspector, Simonds Saw & Steel Co., Fitchburg, Mass., died June 28 at the age of 63.

FRANK A. CORNELL, formerly superintendent of the shops, Shepard-Niles Crane & Hoist Co., Montour Falls, N. Y., died June 23. He retired from active duty a year ago but continued to serve as a director of the company.

MOSES B. KAVEN, vice-president and consulting engineer, United Shoe Machinery Co., died July 1 at his home in Worcester, Mass. He was 73 years old.

JAMES H. PRATT, for the past 27 years president and general manager of the Southington Hardware Co., Southington, Conn., died recently.

R. L. LLOYD, vice-president, Dwight & Lloyd Sintering Co., Inc., and Dwight & Lloyd Metallurgical Co., New York died June 19 at the age of 67. With A. S. DWIGHT he developed the Dwight and Lloyd Sintering process.

WILSON W. BUTLER, president, Canadian Power & Foundry Co., died June 18 at Montreal at the age of 75.

BUSINESS ITEMS

American-Swiss Tool Co., Rockville, Conn., a new company, has leased manufacturing space in the Belding Mill from the American Dyeing Corp. ERNEST BERTSCHE heads the organization which will manufacture dies for Bakelite molds.

Westinghouse Electric & Mfg. Co., has acquired the A. B. See Elevator Co., Inc., New York. No change in officers or employees is expected.

Union Manufacturing Co., New Britain, Conn., is making alterations to its iron castings plant to provide for the installation of new conveyors and other equipment.

The Interstate Engineering Corp., which recently acquired the Moreland Coach Factory building, Redondo Beach, Calif., is building an addition to the structure for offices and drafting rooms, and installing equipment expected to cost $200,000. About 300 men are expected to be employed in the manufacture of airplane parts.

Haynes Stellite Co., Kokomo, Ind., has announced plans for the construction of a new building at its plant in Kokomo. This is the first of several contemplated under an expansion program.

Thompson Products, Inc., Cleveland, has acquired the Jadson Motor Products Co., manufacturer of airplane engine valves, Los Angeles.

Allen-Bradley Co., Milwaukee, has appointed the Nickerson Machinery Co., 110 W. Second South St., Salt Lake City, to handle its line of motor-control equipment in Utah, Southern Idaho and Western Wyoming.

Kropp Forge Co., Chicago, maker of rough and finished drop and hammer forgings, is adding 15,000 sq.ft. for housing added machine shop facilities. The new shop is for producing precision machine work.

Wheelco Instrument Co., Chicago, announced the appointment of WILLIAM PRINTZ as sales manager for the eastern division of the company with headquarters at 45 West 34th St., New York City.

The Lockheed Aircraft Corp. has just completed a one million dollar expansion program which has doubled the old factory floor space. The enlarged facilities are to insure a new production schedule of ten planes monthly and this will be stepped up to fourteen planes with the introduction this month of a new type high speed airliner.

City Auto Stamping Co., Toledo, is spending $100,000 for additional space primarily for additional storage.

MEETINGS

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Pacific Coast Convention. Spokane, Wash., August 31–September 3. H. H. HENLINE, secretary, 33 West 39th St., New York.

INDUSTRIAL RELATIONS CONFERENCE. Twentieth annual meeting. Silver Bay-on-Lake George, N. Y., August 25–28. J. M. GROVES, executive secretary, 347 Madison Ave., New York.

ASSOCIATION OF IRON & STEEL ENGINEERS. Annual meeting combined with Iron & Steel Exposition. Stevens Hotel, Chicago. Sept. 28–Oct. 1.

MASTER BOILER MAKER'S ASSOCIATION. Annual meeting. Hotel Sherman, Chicago. Sept. 29–30. A. F. STIGELMEIER, secretary, 29 Parkwood St., Albany, N. Y.

NATIONAL COACH TRAILER MANUFACTURER'S ASSOCIATION. Exhibit and meeting. Manistee, Mich., August 1–10. E. JUNGCLAS, secretary, 1719 Brackman Ave., Mount Washington, Cincinnati.

EXPORT OPPORTUNITIES

References concerning the following commission agents and importers can be obtained from the Business Publishers International Corp., 330 West 42nd St., New York, N. Y.

Marcel Caes, 4a, Calle, N. O., Managua, Nicaragua, wants prices and catalogs covering concrete machinery of various sizes and capacities.

Denis L. Keleman, 1140 Suipacha, Buenos Aires, Argentina, is interested in scientific precision instruments and material testing machines.

Garces & Cia, P.O. Box 837, Bogota, Colombia, is interested in industrial machinery and public works construction equipment.

Alfonso, Vazquez, Apartado No. 2, Medallin, Colombia, desires contacts with machine tool builders. He is particularly interested in a line of machine shop lathes.

Walter Americo Vela, Apartado 554, Quito, Ecuador, is interested in industrial machinery, railroad and public works construction equipment.

Fabrica de Jabon "La Luz", S.A., Apartado postal No. 2649, Mexico, D.F. Mexico, a large soap making plant, requests data on equipment for nailing or fastening wood boxes.

Angel Munoz de Cote, Ave., Juarez 83, Mexico, D.F. Mexico, is contemplating the establishment of a brass, bronze and malleable iron foundry and desires contact with manufacturers of all kinds of foundry equipment.

Refineria de Sal "El Aguila" S. A., Apartado 200, Mazatlan, Sinaloa, Mexico, a large salt plant requests information on packaging machinery. Address Antonio Rivero, Director Gerente.

R. F. Bayer, Casilla Correo No. 920, Lima, Peru, writes that a new firm, Cia. Pesquera, is in the market for the purchase of machinery for production of round, oval and rectangular flat tinned cans.

Alejandro Delgado Hnos., Calle Real No. 952, Puerto Pimentel, Peru, desires names of manufacturers of electrical material and equipment, including generators.

Melo Queiros, Ltda., Praca de S. Paulo, 19, 20, Lisbon, Portugal, is interested in industrial machinery, electric and steam power equipment.

Gomensoro & Gianelli, 438 Rincon St., Montevideo, Uruguay, wish to contact manufacturers of air conditioning, heating and lighting equipment, also electric pumps and motors.

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* Interested American firms and individuals may obtain the names and addresses of the foreign firms making these inquiries upon application to the Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce, Washington, or any district or cooperative office. Please refer to key number.

Air conditioning apparatus. (Agency.) London, England. *3502.

Bakery machinery, including slicing and wrapping machines. (Agency.) London, England. *3502.

Cables-and-conduits-manufacturing machinery. (Purchase.) Zagreb, Yugoslavia. *3531.

Presses, mechanical, hydraulic; tablet making machines, mixers and equipment; and steel die cleaning equipment. (Purchase.) Joinville, Brazil. *3483.

Forging hammers, drop, compressed air or steam. (Purchase.) Prague, Czechoslovakia. *3522.

Paper bag and envelope manufacturing machinery. (Purchase.) Roubaix, France. *3503.

Construction machinery, new types. (Purchase or agency.) Rueil, France. *3523.

PATENTS

June 22, 1937

Metal-Working Machinery

Ornamenting Machine (Metal). Benjamin W. Freeman, Cincinnati. Patent 2,084,335.

Apparatus and Method for Roling, Forming, and Welding. James L. Anderson, Closter, N. Y., assigned to Air Reduction Co., Inc., New York. Patent 2,084,375.

Edge-Turning Machine. Herbert J. Heller, New York, assigned to H. Weiss & Co. Patent 2,084,395.

Apparatus for Welding. Herman G. Blevins, Sewickley, Pa., assigned to Spang, Chalfant & Co., Inc., Pittsburgh. Patent 2,084,889.

Mechanism for Cutting Sheet Material. Claude R. Babb, Lakewood, Ohio, assigned to The Yoder Co., Cleveland. Patent 2,084,967.

Parts and Mechanisms

Time Relay for Machine Tools (Hydraulic Transmission). Robert A. Schafer, Richmond, Ind., assigned to The National Automatic Tool Co., Richmond. Patent 2,084,562.

Adjusting Means for Variable Speed Transmission. Harry E. Brooks, Columbus, Ind., assigned to Reeves Pulley Co., Columbus. Patent 2,084,723.

Machine Tool Spindle and Arbor. Peter P-G. Hall, Philadelphia, assigned to The Hall Planetary Co., Philadelphia. Patent 2,084,801.

Thread Chasing Mechanism for Automatic Lathes. Rudolf Eckardt, Erich Huth, Fritz Müller, and Richard Rahm, Leipzig, Germany, assigned to National Acme Co., Cleveland. Patent 2,084,898.

Processes

Nitrided Article of Manufacture. Joseph V. Emmons, Shaker Heights, Ohio, assigned to The Cleveland Twist Drill Co., Cleveland. Patent 2,084,329.

Tools and Accessories

Brush for Cleaning Boiler and Other Tubes. Louis J. Spruzzola, United States Navy. Patent 2,084,360.

Adjustable Pliers. Carl Erickson, Brooklyn, N. Y. Patent 2,084,633.

Reamer. Everett L. Magnus, Chicago, assigned to William J. Neumann and Paul Richard Konger, Chicago. Patent 2,084,737.

Piston Ring Expander. Ralph R. Teetor, Hagerstown, Ind., assigned to The Perfect Circle Co., Hagerstown. Patent 2,084,828.

June 29, 1937

Metal-Working Machinery

Lapping Machine. Raymond A. Cole, Worcester, Mass., assigned to Norton Co., Worcester. Patent 2,085,005.

Machine for Producing Helicoid Surfaces (Propeller Blades). John Ferguson, Hoboken, N. J. Patent 2,085,016.

Machine for Grinding Locomotive Wheels. Verner L. Martin, Mount Hope, W. Va. Patent 2,085,378.

Centrifugal Casting. William D. Sargent, Newark, N. J., assigned to Durafer Inc., Newark. Patent 2,085,394.

Machine Tool (Camshaft Bearing Recesses). John M. Strachan, Rockford, Ill., assigned to The Ingersoll Milling Co., Rockford. Patent 2,085,397.

Riveting Machine. Fred A. Howard, Kenmore, N. Y. Patent 2,085,659.

Hydraulic Press. Aiois K. Nowak, Evanston, Ill., assigned to Baldwin-Southwark Corp., Delaware. Patent 2,085,686.

Molding Machine. Frank R. Wallace, Philadelphia, assigned to Tabor Mfg. Co., Philadelphia. Patent 2,085,690.

Hydraulic Press. Richard W. Dinzl, Narberth, Pa., assigned to Baldwin-Southwark Corp., Delaware. Patent 2,085,695.

Parts and Mechanisms

Template-Follower for Torch Carriages. James D. McKiernan, Brooklyn, N. Y., assigned to Air Reduction Co., Inc., New York. Patent 2,085,112.

Photosensitive Relay Tool Control. Harry P. Sparkes, Pittsburgh, assigned to Westinghouse Electric & Mfg. Co. Patent 2,085,127.

Die Apparatus. Vincent J. Graf, Detroit, assigned to Briggs Mfg. Co., Detroit. Patent 2,085,189.

Workholder for Shapers. Herbert E. Tautz, Milwaukee, assigned to The Delta Mfg. Co., Milwaukee. Patent 2,085,235.

Workholder for Saws. Herbert E. Tautz, Milwaukee., assigned to The Delta Mfg. Co., Milwaukee. Patent 2,085,236.

Transmission and Control Mechanism (Miller). Walter Pohl, Detroit, assigned to Kearney & Trecker Corp., West Allis, Wis. Patent 2,085,272.

Steady Rest for Crankshaft Lathes. William F. Groene, Cincinnati, assigned to The R. K. LeBlond Machine Tool Co., Cincinnati. Patent 2,085,357.

Mounting for Lathe Centers and the Like. Attilio R. Spicacci, Bristol, Conn., assigned to General Motors Corp., Detroit. Patent 2,085,456.

End Forming Device (Wire). William H. Blount, West Brookfield, and Percival S. Thomas, Worcester, Mass., assigned to Sleeper & Hartley, Inc., Worcester. Patent 2,085,570.

Machine Tool Headstock. Frank H. Mussler, Stratford, Conn., assigned to The Bullard Co. Patent 2,085,684.

Cross-Feeding Tool Slide. Frank H. Mussler, Stratford, Conn., assigned to The Bullard Co. Patent 2,085,685.

Tool Slide and Dwell Mechanism. Edward P. Bullard, III, Fairfield, Conn., assigned to The Bullard Co. Patent 2,085,692.

Processes

Method of and Apparatus for Forming Slugs and Extruding the Same. John H. Friden, East Orange, N. J., assigned to The Sun Tube Corp., Hillside, N. J. Patent 2,085,078.

Process of Fabricating Laminations. Ernest L. Furth, Pittsburgh, assigned to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Patent 2,085,092.

Method of Forming Hollow Vessels. Robert G. Guthrie, Chicago, assigned to Reconstruction Finance Corp., Chicago. Patent 2,085,313.

Welding Method. Arthur F. Hanson, Philadelphia, assigned to Budd Wheel Co., Philadelphia. Patent 2,085,583.

Electric Weld Timer and Method. Donald V. Edwards, Montclair, N. J., assigned to Electrons, Inc., Delaware. Patent 2,085,696.

Tools and Accessories

Rotary Cutter. Stanley H. Grattan, Detroit, assigned to Goddard & Goddard Co., Detroit. Patent 2,085,095.

Portable Welding Tool. Joseph R. Lex, Detroit, assigned to General Motors Corp., Detroit. Patent 2,085,105.

Micrometer. Ernst Muller, Oakland, Calif. Patent 2,085,380.

Combination Rule and Slidable Head. John S. Chafee, Providence, R. I., assigned to Brown & Sharpe Mfg. Co., Rhode Island. Patent 2,085,461.

After 50—What Then?

ROGER C. DICKEY

The International Paper Box Machine Company

SOME TIME next July Ned Simonds will celebrate his 71st birthday in the manner which will give him the greatest satisfaction. He will punch the time clock at seven in the morning and work until twelve. He'll eat his lunch, tell tall stories to his shop mates until one, then work until the five o'clock whistle blows. Those old-fashioned glasses of his will slip down on his nose when he becomes absorbed in a job, but when that job is done the foreman knows it will be thoroughly and accurately done. The time consumed in completing it will be no longer than the time taken by many men half his age in finishing the same task.

Knows Tricks of the Trade

Ned Simonds knows machine shop fundamentals. He served his apprenticeship building woodworking planers and lathes. In the years that followed, he worked in many machine shops building a variety of different machines, and now he's making folding box machinery. He has discovered for himself, and picked up from his associates, a wealth of "tricks of the trade" which enable him to employ short cuts in his daily work.

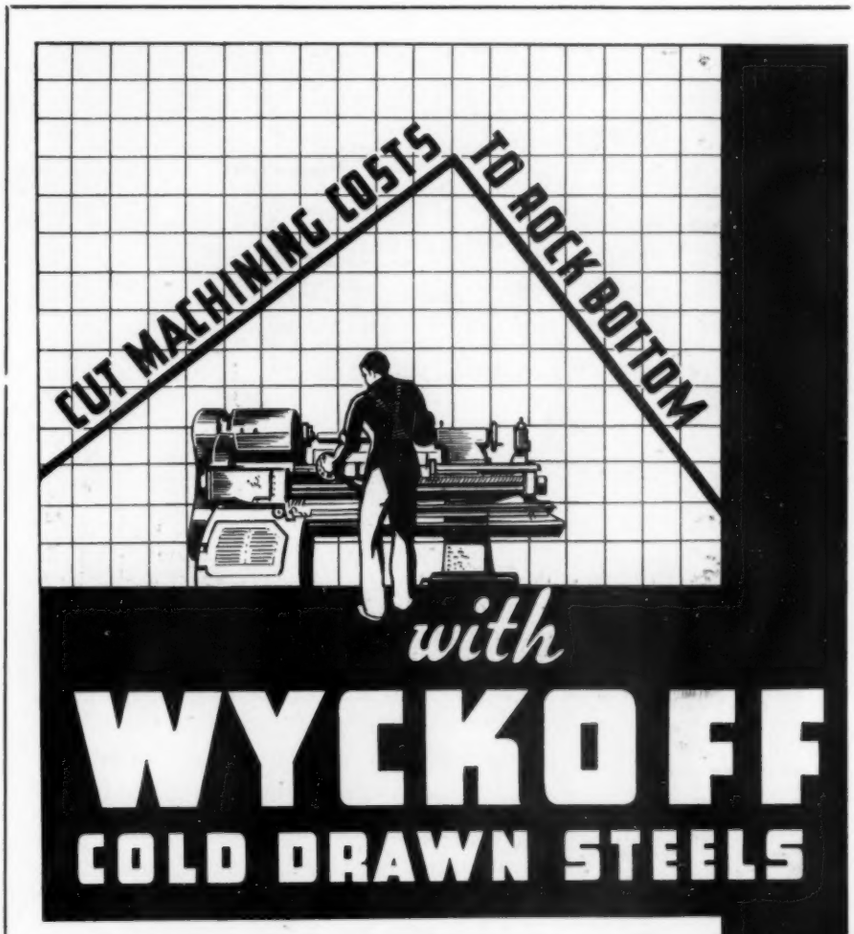
He is not a fictitious character. He is real flesh and blood. There are men like him in every machine shop. Men respected in the community for their good citizenship; men respected in the shop for their knowledge.

In recent years we have heard considerable about old men and industry. All too often we have heard of men who, after 50, have lost their jobs because of age. Volumes have been written on the subject; in fact Walter B. Pitkin wrote a best selling non-fiction book entitled "Life Begins at Forty." Admitting that the situation exists and must be dealt with, social security laws have been enacted.

It would have been interesting if, when Ned Simonds was 40, he had asked himself two questions: "What have I to contribute as a machinist from this time on?" and "What have I to expect from my trade in the way of steady employment?" We know the answer. He had more than 30 years of service to contribute, and in recompense he was able to receive the prevailing scale of wages during this period. It goes without saying that those 30 years were the most productive in his life. The foundation he had built as a young man in becoming proficient in his trade enabled him to weather the depression much better than many a younger man.

It is indeed a tragedy that so many industries are casting off men because of their age. But of all the trades, the machinist's trade has taken the most logical stand; that a man's experience and training can be used to good advantage even though his hair is gray. It is a logical stand because the gray-headed machinist is ready to cash in on the degree the college of experience has passed on to him. He is worth every bit as much as the younger man and more in many instances.

In the 1880's apprenticeship training was considered indispensable in the machinist trade. It was a requisite that a boy spend at least three years in learning the trade. As a result he was thoroughly grounded in fundamentals. But as the years progressed and mass production came into being, all that was required of a man was to operate a single machine per-



NO need to incur the expense of machining Wyckoff Cold Drawn Steel Bars with the wide variety of standard sizes and shapes readily available through Wyckoff Warehouse Stocks.

In Wyckoff Cold Drawn Bars you not only obtain a complete choice of size tolerances but also a bright, smooth surface which cuts machining costs to a minimum. Why not obtain lower production costs, higher profits and more business with the aid of Wyckoff Cold Drawn Steel?

WYCKOFF DRAWN STEEL COMPANY

General Offices: First National Bank Bldg., Pittsburgh, Pa.
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Manufacturers of . . . Carbon and Alloy Steels . . . Turned and Polished Shafting . . . Turned and Ground Shafting . . . Wide Flats up to 12" x 2" Warehouse stocks carried by nationally known distributors.

forming a single operation. The apprenticeship idea was not enforced to the extent that it should have been.

This all goes to prove two points: first, that apprenticeship training is absolutely essential; and second, that men with the proper foundation can produce whether old or young. The industry that does not train its youth to be first-class journeymen will cast off its workmen after 50 because they are not first-class producers. It is an inexorable law of nature that a man must produce to receive recompense.

It is admitted that society owes a debt to the working man. But we all know that the old man is reluctant to collect that debt at the expense of the public. He would much prefer self-respecting work as long as there is work that he can do. The industry producing first-class workmen will have little cause to fall back on Social Security. Industry itself will absorb its aged. It will pay industry to do so because of the value of the service the older men have to render.

I do not consider a man who performs a single operation on a single machine at piece rates as a machinist. I prefer to think of a machinist as a man who knows how to operate different metal-working machines, who can read blueprints and who can assemble component parts into an operating unit. This man, well versed in his trade, has little to fear in his declining years.

It is up to industry to stress, and to keep on stressing, apprenticeship training. The concern incorporating apprenticeship training in its plant is rendering a valuable service to itself, to the industry and, in the years to come, to the workman.

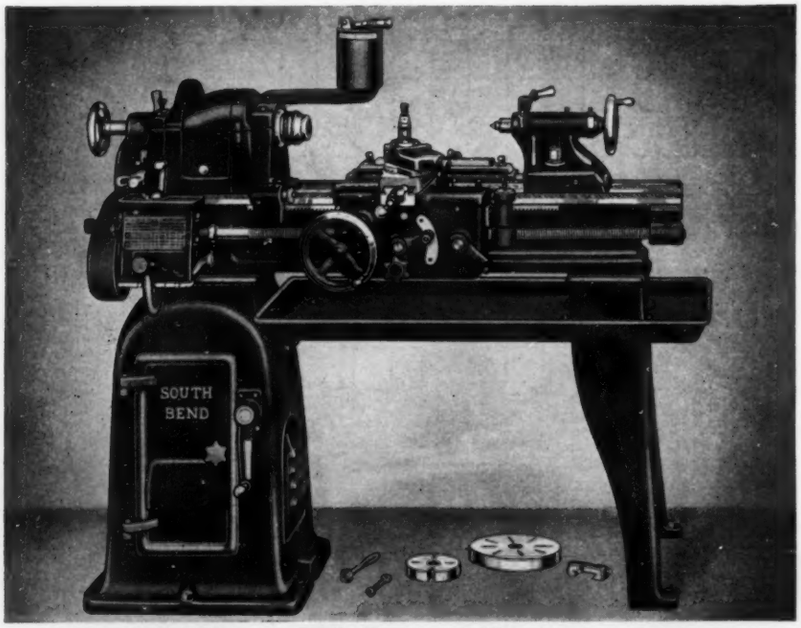
Side Lights on the Railway Exhibits

Among the outstanding features of the exhibits at the railway convention at Atlantic City, N. J., June 16 to 23, was the attention paid to reducing the weight of reciprocating parts. New designs for locomotive connecting and side rods, crossheads and pistons, made possible by the use of higher quality steel, reduce unbalanced weight to a marked degree. Driving-wheel center castings have also changed greatly in design, the old spoked wheel having largely gone by the board. Truck frames, too, are being made appreciably lighter, all tending to reduce the dead weight of trains.

Roller bearing applications to main driving, trailer and truck axles are now fairly common and are made by more than one maker of these bearings. One crosshead was shown with rollers on the pin bearing. Special lead alloy plain bearings were also displayed, including crosshead shoes.

Only a few machine tools built solely for railroad work were exhibited. These included a heavy boring mill with side head, a quartering machine, axle lathes, a wheel borer, and a staybolt cutter for taper thread bolts. The use of the quartering machine is being extended beyond boring the holes for crankpins. It has been found that driving wheels are distorted by the pressing in of the crankpin. This and any misalignment due to cocking the pin in pressing it in, gives a bad bearing condition for service.

To correct this many roads now finish turn the pins after they are in place, using a special tool head instead of the boring head. Rolls are also provided for burnishing the pins after turning. This method insures



No. 8111-A, 11" x 4' Tool Room Quick Change Gear Underneath Belt Motor Driven Lathe complete with draw-in collet chuck, taper attachment, chip pan, ½ H.P. Instant Reversing Motor..... $720.00

Write FOR NEW CATALOG

Catalog No. 96 illustrates, describes, and prices the new 1937 Series of South Bend Precision Lathes in all sizes and styles. A valuable book for the shop man, engineer, and plant executive. Sent free, postpaid, upon request.

THE new 1937 Series of South Bend Back-Geared, Screw Cutting Precision Lathes with Double Wall Aprons and hardened and ground headstock spindles are recommended for the finest and most accurate work in the tool room, machine shop, manufacturing plant, and laboratory. Offered in sizes from 9" to 16" swing, in bed lengths from 3' to 12', Underneath Belt Motor Drive, Countershaft Drive, and Pedestal Motor Drive.

SOUTH BEND LATHE WORKS
277 East Madison Street
South Bend, Indiana, U. S. A.

SOUTH BEND *Precision* LATHES
MODERN LATHES FOR MODERN INDUSTRY

that the pins are parallel with the axle and gives a better bearing by insuring correct alignment. All of which is another reason for modern machine equipment and methods.

The increase in the size of motive power, as shown by the new locomotives of several railroads, indicates the increased necessity for proper maintenance. Taking the B.&O. 5600 as an example, there are four 18 x 26½ cylinders, with 76-in. drivers, a boiler pressure of 350 lb. in a water tube boiler, with a 4-4-4-4 wheelbase. It is really two 4-4 or American type locomotives on one frame, with a total weight of 736,500 lb. In addition the tender carries 22,000 gals. of water and 23 tons of coal. The total wheelbase is 117 ft.

Next is the 3600-hp. diesel locomotive of the same road which recently made a non-stop run from Cincinnati to Washington, 551.4 miles. This has a wheelbase of 127 ft. 1 in. for the two units and weights 570,600 lb. There are four power units of 900 hp. each with twelve cylinders 8 x 10 in. and eight traction motors on the driving wheels. These, together with a large Pennsylvania electric locomotive, are typical of the changing problems that confront the railway shops of today.

Jigs and Fixtures

J. EADY
Heaton Mersey, Manchester, England

REFERRING to the article under the above title (*AM*—Vol. 81, page 191), to designate a jig as a work-holding device that is not fixed but rests on the machine table only, and a fixture as a work-holding device that is temporarily fixed only is surely not the best way to differentiate between a jig and a fixture. The difference between them must be greater than that suggested by the foregoing designation, otherwise the same work holder could be either a jig or a fixture, depending upon whether or not it was clamped down to the machine table.

"Jigging" has one interpretation only. The machinist always understands that a part to be jigged is one that is to be machined from controlled tool and work locations. Consequently a jig must locate both the work and the tool. For example, a drill jig carries bushings to guide the drills and locates the work in relation to the drills. Boring and reaming jigs function in a similar manner.

A fixture is merely a work-holding device and, so long as it will hold the work it is a fixture, whether clamped to the machine table or not. The machine vise is one of the most common fixtures in use.

The fundamental difference then is that a fixture holds or locates the work, while a jig holds the work in relation to the tools.

Foremen have Powerful Influence

ACCORDING to Bennett Chapple, vice-president of The American Rolling Mill Company, the foreman in today's corporate enterprise is not only the key man of production but he is also the most powerful influence in fashioning the pattern of workers' lives. He can be helpful, he can encourage his subordinates to take an interest in their work and to improve their knowledge of company operations and company policies, or he can be merely a cold, machine-like and an unsympathetic supervisor of production.

"The inventor of the continuous mill for the rolling of iron and steel

PHOTO COURTESY UNION PACIFIC RAILROAD

Vacation Without A Worry

● Try the Ryerson "Vacation Without a Worry" plan that eliminates all thought of delayed, slow or uncertain steel deliveries—and make yours a real vacation . . . We have thousands of tons of steel in stock and for almost a century we have been demonstrating our ability to quickly and accurately deliver steel as needed . . . Let us shoulder your steel worries . . . Simply tell your assistant to "Call Ryerson when steel is needed." Emergency as well as regular requirements will be taken care of promptly. Joseph T. Ryerson & Son, Inc. Plants at Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

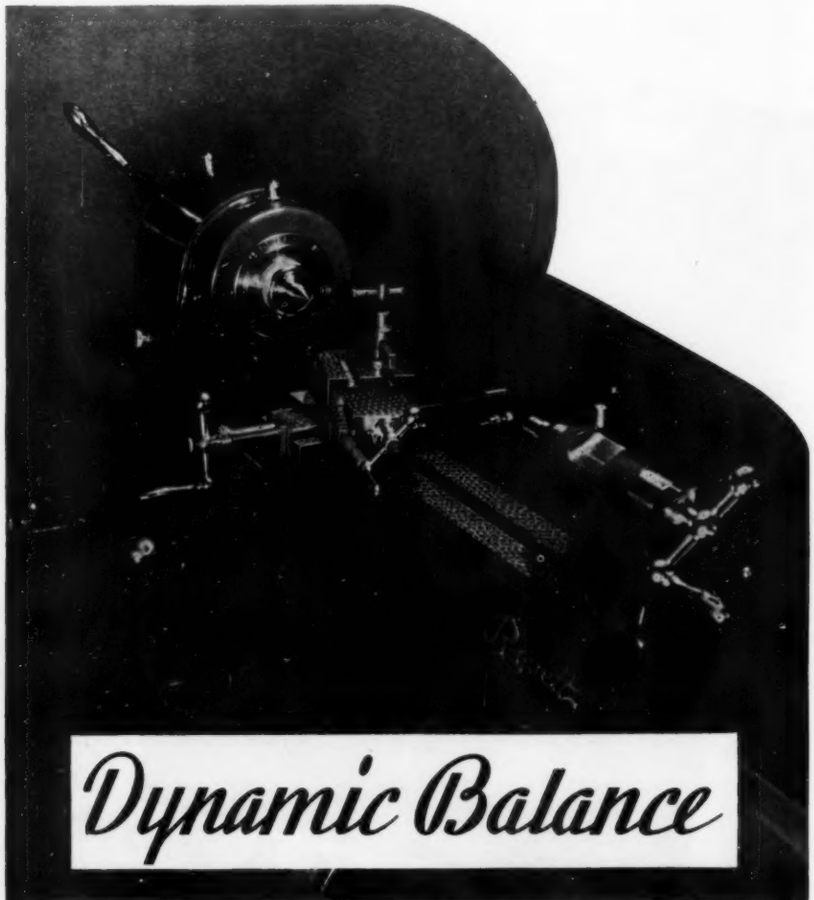
RYERSON

sheets was a foreman in the Armco plant," Mr. Chapple said. "That man was John B. Tytus, now a vice-president of the company. Today there are 21 of these great continuous mills operating under license with Armco.

"The forces of science and research, coupled with developments in business and industry, are opening up new highways of progress for civilization. We are traveling these highways, and we are going at a high speed, industrially speaking. We can't all be Fords or Schwabs, but in every group of foremen there are some who will some day reach the top."

Parts that Fit

STANDARDIZATION of railway repair parts is receiving more attention than some of us realize. Bushings and pins for locomotives and cars are now being made in quantities and supplied by at least one manufacturer. These pins and bushings are made for spring riggings and for brake levers. They are made of hardened and ground steel, to standard sizes and can be supplied at low cost because of large scale production. With these pins and bushings on hand repairs can be made without loss of time and, because of uniformity in the material and the fits, the wear life is longer and more uniform. The more such standardization, the lower the cost of maintenance.



Dynamic Balance

RIVETT roller bearing bench lathe equipped with Timken "Zero" precision mirror finish bearings provide the combination of high precision and rapid production required of a modern efficient tool. Every rotating part is dynamically balanced to insure a rigid vibrationless spindle from 100 to 2300 r.p.m. Turning tools capable of high cutting speeds can be used assuring production with work held to extremely close limits. Many manufacturers today are experiencing the production possibilities of the Rivett roller bearing bench lathe. Bulletin 505-RB provides further details.

RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.
PIONEERS IN BENCH LATHE DEVELOPMENT

Coated Abrasives

IN INDUSTRIAL plants, both large and small, we often find one kind of abrasive being used where another type would do the work more satisfactorily at less cost. There is a special type of coated abrasive for each class of work. All of these are made according to accepted government standards and, if you know what you require, the proper abrasive can be secured from any and all of the manufacturers in the industry.

Only five abrasives are in general industrial use today—flint, garnet, emery, silicon carbide and aluminum oxide. The first three are mined products and are sold under their real names; but the electric-furnace abrasives, silicon carbide and aluminum oxide, are marketed under more than 40 different trade names.

Generally speaking, all backings for coated abrasives are of paper, cloth, or a combination of paper and cloth. Flint sheets are made up on Kraft paper backing. High-quality woodpulp or rope papers and drill or jean cloths are used for garnet, emery, aluminum oxide and silicon carbide coatings.

Success in the use of coated-abrasive materials will depend as much on the backings, as on the kind and size of grits employed.

Coatings

Different classes of work and different kinds of materials to be worked require coatings of different construction. There are two methods of applying grain to the various backings; they are known as *"closed-coat"* and *"open-coat."* Sheets or belts with a closed-coat have a surface that is densely covered with as much grain as the glue will hold. These are employed in cutting hard metals and all materials, generally speaking, which do not have a tendency to "fill" the surface of the abrasive paper or cloth.

Maximum work-value is obtained from a closed coat, where it can be used, because there are a maximum of cutting edges available.

An open-coat material has grain that has been applied evenly, but openly, to the surface. The idea of the open coat is to provide blank or open spaces between the grains, in which the cuttings may lodge until they have had a chance to fall off. Such a coating will not clog or fill as readily as will a closed coat.

Comparative work-value of open and closed coats cannot be judged because each kind of coat gives maximum results on work for which it is intended. Thus, a closed coat should and will do more work on hard metals, hard wood, or other hard surfaces—but if used on a soft or gummy surface it will fill quickly and only part of its work value will have been employed.

When glue and grain are applied to either a paper or cloth backing, the finished product is naturally stiff; the glue surface, in addition, is brittle. Maximum work-value can be attained only where the coating, or glue bond, is not broken. In many operations this is not practical, and a more flexible material is essential, even at the expense of work-value.

Coated abrasives are flexed by drawing the back of the material over a sharp edge, which has the effect of cracking up the glue bond into small pieces. The sharper the edge, the more completely will the surface be cracked. In flexing, it is usual practice to draw the material over sharp edges in right-angular directions—thus the entire surface is converted into tiny islands, each stuck to the backing and each holding its share of abrasive grit.

Abrasives

Abrasives may be divided into two classes, as follows: (1) Non-technical abrasives—flint and emery, and (2) technical abrasives—garnet, aluminum oxide and silicon carbide.

The non-technical abrasives are graded very much the same; that is, a No. 1/0 emery is in size of grain about the equivalent of a No. 1/0 flint. These abrasives are designated by grade number only, such as No. 1/0, ½, 1, 1½, etc.—not by screen mesh numbers.

Technical abrasives are all graded and controlled through the same screens, which are coarser by approximately two grades than are the screens for non-technical abrasives; that is, a No. 1/0 garnet or aluminum oxide is equivalent in size of grain to a No. 1 flint or No. 1 emery. These abrasives may be identified by the screen mesh number alone (such as No. 100) or by combined grade number and screen mesh number (such as No. 2/0-100. The number 100 in these examples designates the mesh of the controlling screen.

The coating of flint sandpaper is crushed quartz, carefully graded into eleven grits. The backing is Kraft paper—the bond is glue. Flint sandpaper is satisfactory for all ordinary sanding of wood and paint. The abrasive is relatively soft—not oversharp.

Emery is a mined, natural abrasive that has been used for this purpose for thousands of years. The best quality comes from Turkey and the Greek islands. It is a natural aluminum oxide, relatively soft and dull when compared with the electric-furnace product. Until the advent of electric-furnace abrasives, emery was practically the only shop abrasive and was used for all purposes. Being soft,

SUPER-SERVICE RADIALS

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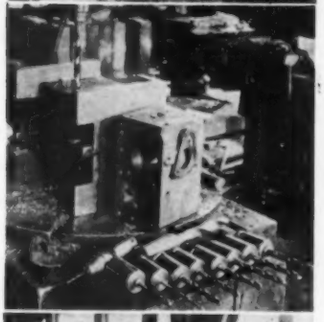

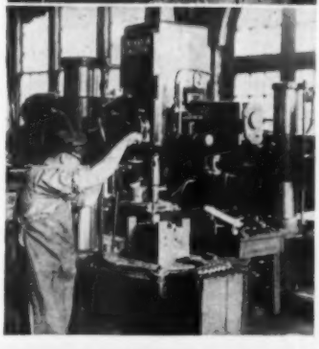

• These views show a few of the 15 High-Speed, All-Geared Super-Service Radials recently installed by a nationally-known manufacturer, whose work includes a variety of jobs like the one shown in the center photograph. Operations in sequence are as follows: Drilling —six 9/16″, seven 13/32″, one 7/16″, one 3/8″, one 15/16″, one 29/64″, one 21/64″, one 3/16″, one 1/2″, one 1/4″, two 1/8″—23 HOLES PER PIECE IN ELEVEN DIFFERENT SIZES.

In addition, eight holes are tapped. Ability to change over quickly in order to handle a wide range of hole sizes economically on Super-Service Radials makes their use particularly advantageous. Their speed and ease of handling will inspire your operators.

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emery cannot be employed economically for cutting hard metals. A relatively soft, dull crystal is just the thing for polishing metals and here is where emery finds its greatest use.

Garnet is a mined product used in jewelry and many other ways, but its greatest service is had when it is crushed, graded and used for coated abrasives. The best garnet comes from mines in New York State. The right kind of garnet is vastly sharper than flint and very much harder. It will, therefore, cut faster and cleaner, and will perform more work than flint. Although it is more expensive than flint, its work-value is so much greater that it actually costs less to use.

The electric-furnace product, aluminum oxide, is probably the hardest, toughest and sharpest abrasive material in general use. While it is the outstanding abrasive employed in all metal and machine shops, it is also largely employed for wood-working, especially when production is the chief objective.

Silicon carbide is extremely hard and very sharp—but it is very fragile. It is little used for cutting metals, but it is extensively used in the wood-working and leather trades, where sharpness is essential.

Trade-Name Identification

In the following table are listed various trade names applied to electric-furnace abrasives. Opposite each trade name is given the name of the abrasive employed.

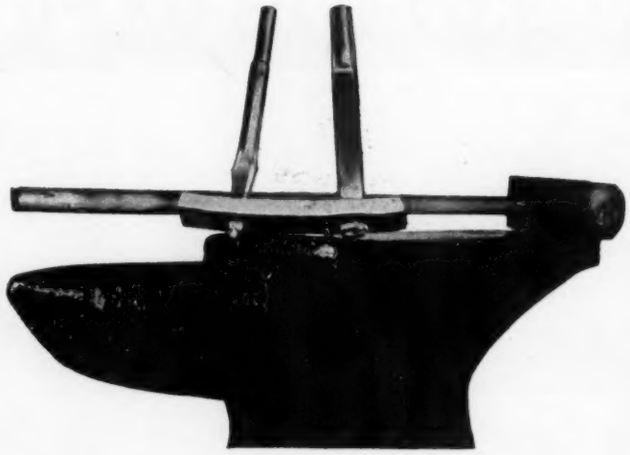
TRADE NAMES	*ABRASIVE USED*
Abrasite	Aluminum oxide
Adalox	Aluminum oxide
Adamite	Aluminum oxide
Alabrase	Aluminum oxide
Alorix	Aluminum oxide
Al-Ox	Aluminum oxide
Aloxite	Aluminum oxide
Alundum	Aluminum oxide
Amunite	Silicon carbide
Ansandum	Aluminum oxide
Ansilicon	Silicon carbide
Ansolox	Aluminum oxide
A-O-66	Aluminum oxide
Armourite	Silicon carbide
Baco	Aluminum oxide
Blue-Stripe	Silicon carbide
Boxite	Aluminum oxide
Carbalox	Aluminum oxide
Carbicon	Silicon carbide
Carbonite	Silicon carbide
Carborix	Silicon carbide
Carborundum	Silicon carbide
Crystolon	Silicon carbide
Crystox	Silicon carbide
Durite	Silicon carbide
Durundum	Aluminum oxide
Electric-Abrasive	Aluminum oxide
Garalun	Aluminum oxide
Herculundum	Silicon carbide
Jewelite	Silicon carbide
Jewelox	Aluminum oxide
Luminox	Aluminum oxide
Lumnite	Aluminum oxide
Metalite	Aluminum oxide
Production	Aluminum oxide
Sil-Carb	Silicon carbide
Three-M-ite	Aluminum oxide
Tri-M-ite	Silicon carbide
Usalox	Aluminum oxide
Wausite	Aluminum oxide
Yellow-Stripe	Aluminum oxide

Abstracted from the booklet "What are the Various Coated Abrasives? What Are Their Uses?", published by Clover Manufacturing Co., Norwalk, Conn.

Copper Sulphate Solution

CHARLES WESLOW

COPPER SULPHATE solution has long been known as a means for marking steel surfaces, in order that a scribed layout line may be seen easily. No one in the shop where I work seemed to be successful in making up the solution so I induced the foreman, Mac, to buy a pound of copper-sulphate crystals. Then I got a quart milk bottle and filled it with distilled



MAGIC CHISEL STEEL

YEARS of research and study of field performance have produced one of the toughest and most durable chisel steels on the market.

Unexcelled shock resistance and its ability to retain a keen cutting edge under the most severe working conditions justify the statement that Magic Chisel Steel is one of the best steels available for pneumatic and hand chisels.

Other uses include punches, dies, pipe cutters, rivet sets, and like tools.

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water to within a half-pint of being full. A tablespoonful of the crystals was then powdered on a cast-iron plate and poured into the bottle. The bottle was set on a steam pipe nearby and after two hours, when the powder had disappeared, I added another tablespoonful of powder. It was six hours before all of that vanished into the water.

It took ten hours for the third tablespoonful of powder to vanish and then another similar portion was added, this was dissolved in 24 hours. Another portion was then added and this did not dissolve for another 72 hours, at which time I added a final tablespoonful of powder, together with a teaspoonful of sulphuric acid. Use sulphuric acid; never nitric acid, because that eats up the copper in the water.

It was almost a week before the solution was ready to apply to a steel surface, but then it didn't matter if the surface was oily as this solution will "bite" through to the surface of the steel anyhow.

What Dulls a Milling Cutter?

O. W. WINTER

GREATEST economy does not always result from using a milling cutter so as to insure maximum cutter life. Tool cost is only a part of the total cost per piece of work produced. While increasing cutter life reduces tool cost, there is a point where this reduction is less than the resulting increase in labor cost per piece.

Factors which cause a milling cutter to become dull can usually be listed under three general classifications: abrasion, overheating and pressure.

Under good milling conditions, abrasion is the most common cause of dull cutters. A good coolant that properly lubricates the cutter and work will reduce abrasion considerably. Feed per tooth should be enough to allow each tooth to cut a chip and not merely slide over the work, as is common in the case of light feeds. Dulling by abrasion is largely dependent upon the abrasive nature of the material being milled.

Castings with sand inclusions, bakelite and similar materials will dull cutters more rapidly than a clean, homogeneous steel. Tests have shown that cutter wear by abrasion is directly proportional to the number of tooth contacts per minute. This relation holds true under correct milling conditions, up to the point where the cutter becomes dull. From this point on there is a continual loss in this ratio, for the reason that a dull cutter increases the amount of abrasion.

Cutter abrasion, being proportional to the number of tooth contacts per minute, is not affected by speed or feed, provided neither is great enough to bring on dulling by overheating or by pressure. Inasmuch as production is based on feed in inches per minute, the logical way to secure maximum hourly production and maximum number of pieces per grind of cutter is to mill the work with a minimum number of tooth contacts.

Dulling by Overheating

Dulling by overheating is a matter of balance of heat transfer. If more heat is generated than is dissipated, temperature of the cutting edge is increased. Should this temperature become sufficiently large, hardness of the cutter is reduced and dulling action by abrasion is rapidly increased.

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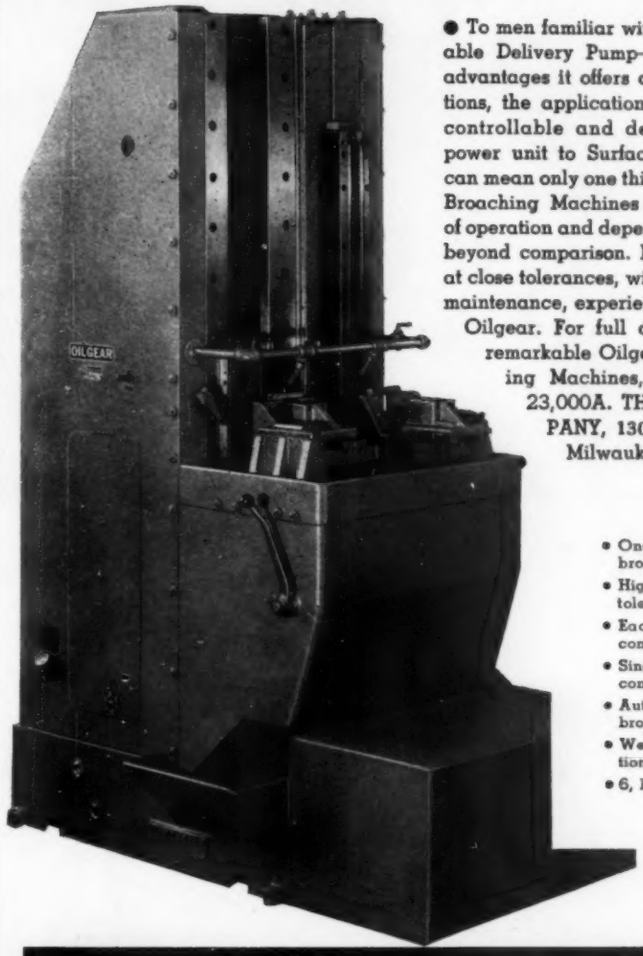

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OILGEAR

SURFACE BROACHING MACHINES

Heat dissipation can easily be accomplished by using a large volume of effective coolant.

Heat formation can be retarded by reducing the speed of cutter rotation. Feed and size of cut contribute to heat generation, but their effect is less than that of speed. Clearance angles that are too large have the effect of reducing the volume of cutter metal at the cutting edge, where it is needed to absorb and diffuse heat to the cutter body. A good rule to follow with high-speed steel cutters is that discolored chips indicate a likelihood of rapid dulling by overheating.

Cutting tool materials of various types are available for particular applications. Many of these have a high degree of red hardness, permitting use of cutters under elevated cutting temperatures. An increase in red hardness is usually accompanied by a decrease in strength or an increase in brittleness. The ratio of increase in brittleness to increase in red hardness will determine to what extent the feed per tooth can be maintained.

Dulling by Pressure

Aside from major failure of the cutting tool, dulling by pressure is characterized by a minute chipping out of the cutting edges. It is invariably attributable to too much pressure on the cutting edge. This pressure will depend on the character of the material being milled, the feed per tooth and the impact of the cutter tooth striking the work. This impact is a function of speed and increases in speed increase the impact force.

Impact force is at its maximum when, at a given speed, the entire tooth strikes the work at once. In such cases a helix angle on the tooth relieves the blow and produces a slicing or shearing action. This action, in turn, produces an abraiding effect along the tooth edge. Hence an increase in the helix angle should be accompanied by an increase in the initial hardness of the tool.

It is important to note at this point that a chattering cutter increases the tendency toward dulling by pressure. Chattering, in effect, is a rapid succession of impacts on the cutting edge, the resultant pressure of each impact being greater than the cutting pressure under the same but non-chattering conditions.

Check List For Fixture Design

While the details of fixture design depend on several factors, such as cost, quantity work and the ingenuity of the designer, there are many things to be considered during the design period. The following points are listed by the Taft-Pierce Mfg. Co., for guidance in making and checking tool drawings. Whether or not they are listed in the order of their importance is difficult to determine. They are:

1—Simplicity
2—Rigidity of clamping devices
3—Sequence of operations
4—Interferences in the tool itself
5—Interferences with the machine on which used
6—Clearances for work and hands
7—Avoidance of chip pockets
8—Make locating points correspond with dimensions on part drawing and with locating points on other tools for the same part
9—Convenience and speed in operation

10—Accuracy of work produced
11—Durability
12—Economy of construction
13—Use stock sizes of material

In making the drawing it is necessary to consider the accuracy as to scale, the correctness of the projections, proper representation of the fixture and the work, and its blueprinting qualities.

Dimensions on the drawings must be accurate, must be put on by a method that will insure that there are enough without repetition. They must be legible, contain the tolerances in understandable form and dimensions which are out of scale must be properly marked to call attention to that fact.

Drawings must also contain information or specifications as to materials, finish marks, kind of heat-treatment if any, finish of surfaces by grinding or otherwise, necessary notes, instructions for marking, part numbers and title of the part.

Where patterns are to be made there are five major considerations:

1. Economy of construction
2. Ease of molding
3. Equality of sections to avoid unequal shrinkage
4. General appearance
5. Stock patterns should be used wherever possible.

Standard drawing symbols have been adopted by the American Society of Mechanical Engineers and other societies and are now a standard of the American Standards Association. These should be used to avoid confusion.

Thoughts on Writing Short Technical Articles

H. R. HAGEMAN

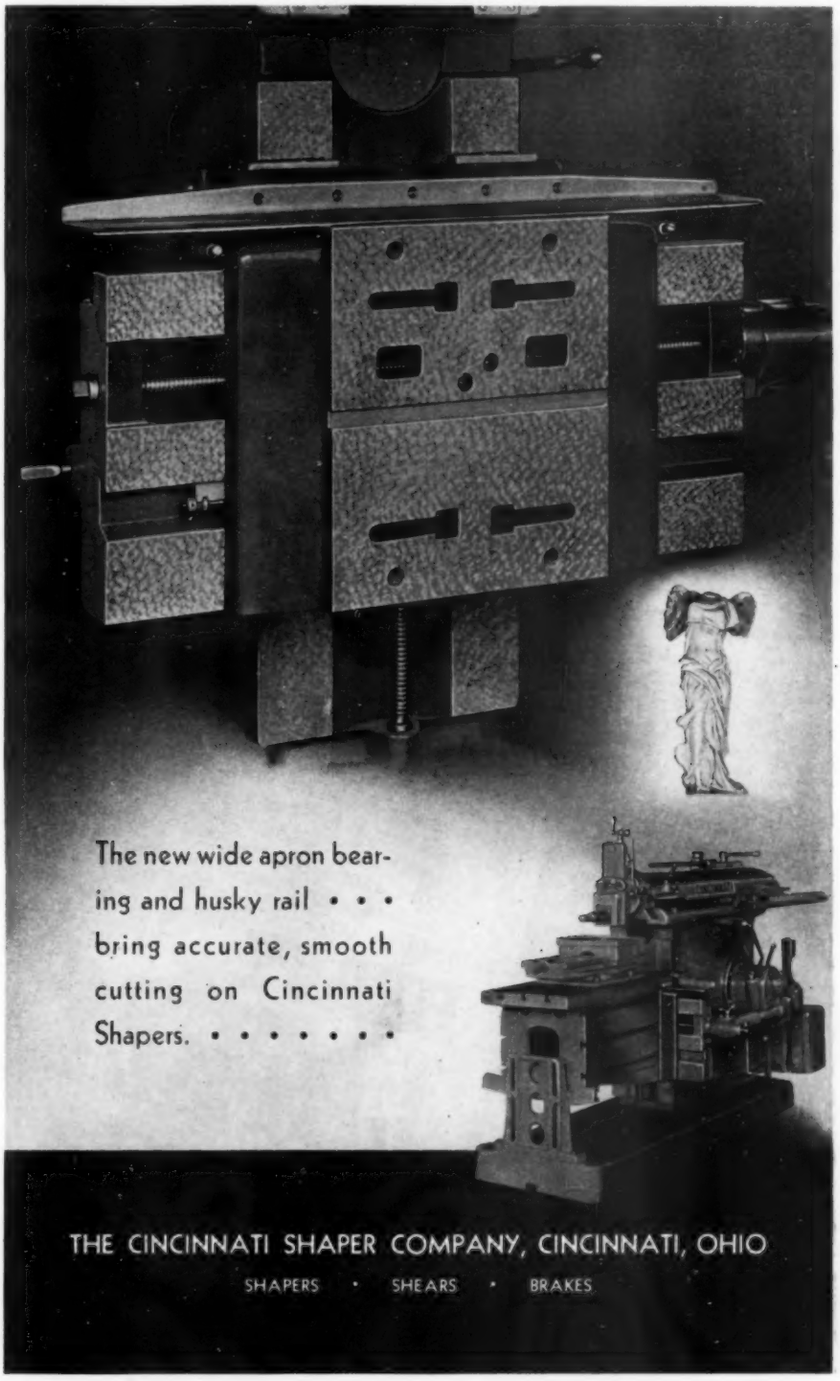
THE PRACTICE of contributing short articles to technical magazines is of great value to any one who undertakes it with the right attitude. It teaches one to express one's self in a clear and concise manner, so that the reader will readily grasp the idea. Not only does each succeeding attempt become easier, but after a little practice it also becomes easier to explain an idea orally, employing proper terms instead of such meaningless words as "gadget," "doodad" or "ding bat," which should be used by a mechanic who is expected to know pawls, ratchets and cams well enough to call them by their first names.

Another advantage derived from such writing is that it makes an idea clearer to the one who writes it, showing up any flaws it may have, as well as confirming and clarifying its good points.

Flowery, high-sounding language has no place in such an article any more than has the common variety of slang, although some of the more generally accepted slang words and phrases are quite expressive and help to enliven the article.

It is well to write and rewrite an article until the meaning is expressed as clearly as is possible. The few rejections I have received in fifteen years of writing have been the result of failing to make my ideas clear to the editors.

Worthwhile articles from the field are usually welcome, but it is well to be sure of one's ground before making positive statements. Some writers are inclined to tell how to perform certain operations instead of confining themselves to describing the results. That might be all right if the readers were all first-year apprentices, but otherwise the writer risks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displaying his own lack of information, since any experienced mechanic might have a different method which is just as good or even better.

•

IN A FACTORY where plastic materials are finished by pressure in a steam-heated press, the output was limited by the weight of a stack of sheets that could be lifted by the operator. Tradition said that slip sheets of brass plates must be used to secure the desired surface on the plastic pieces. A new foreman insisted on trying much-lighter polished dural plates. This change immediately increased the output 25 per cent, because of the less fatiguing handling involved.

•

PRECISION welding is playing an important part in the manufacture of many small parts such as go into typewriters and other office machinery. Instead of drilling or punching holes, shouldering small shafts or pins, and staking them in place as was formerly the way, a precision fixture holds a plain, flat-ended pin in correct position and a perfect weld is made, without flash, in a fraction of a second.

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Written for metallurgists, design engineers and others interested in the production, fabrication and use of metals. Is a review and reference source for the chemical composition, physical properties, heat-treatment, recommended applications and fabricating procedure of irons and steels in which vanadium is an alloying element. Illustrated with 71 photomicrographs and 178 charts and tables. Bibliographic references under each chapter head include a number of new sources.

A special chapter is devoted to consideration of high-test alloy cast irons, a field in which considerable progress has recently been made. The index is complete and gives direct references to particular alloy steels and their properties.

Available Literature

HEALTH PROTECTION. A 27-page booklet, entitled "Health Protection of Welders," is offered by Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York. This report discusses the types of welding and lists four principal hazards that are encountered.

WAGE AND HOUR REGULATION. Booklet No. 22, entitled "The Futility of Federal Wage and Hour Regulation," by Allen W. Rucker in collaboration with N. W. Pickering, has been published by Farrel-Birmingham Co., Inc., Ansonia, Conn. It is claimed in this booklet that the Black-Connery Bill, in its attempt to enlarge incomes by raising the minimum wage rate, will have one of two destructive effects. It will compel a scaling down of wage differentials, or it will result in a further shrinkage of employment,